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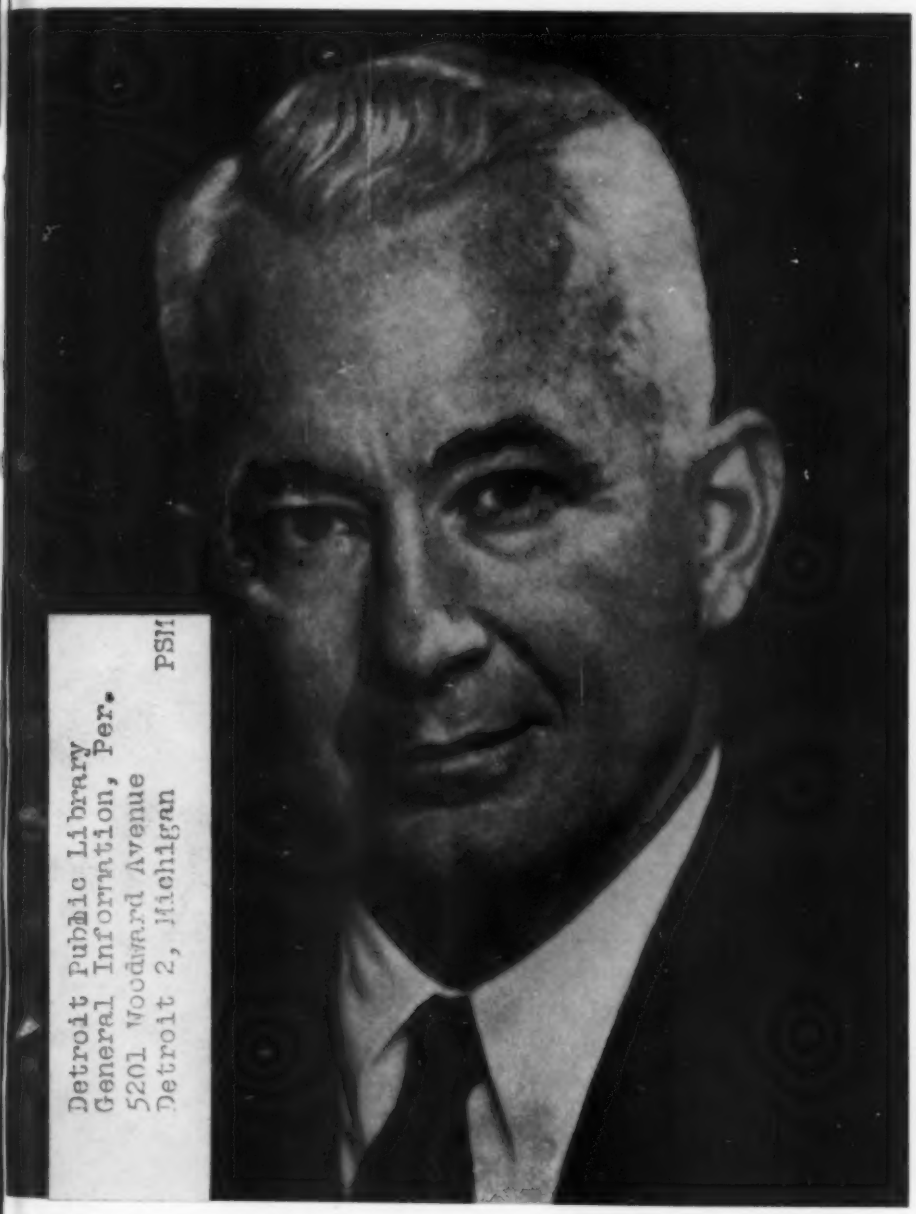

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Exclusive this month:

Policy decisions needed to make the marketing concept work

Production methods:

Hubbard-Hall uses centrifugal mixing for quality products

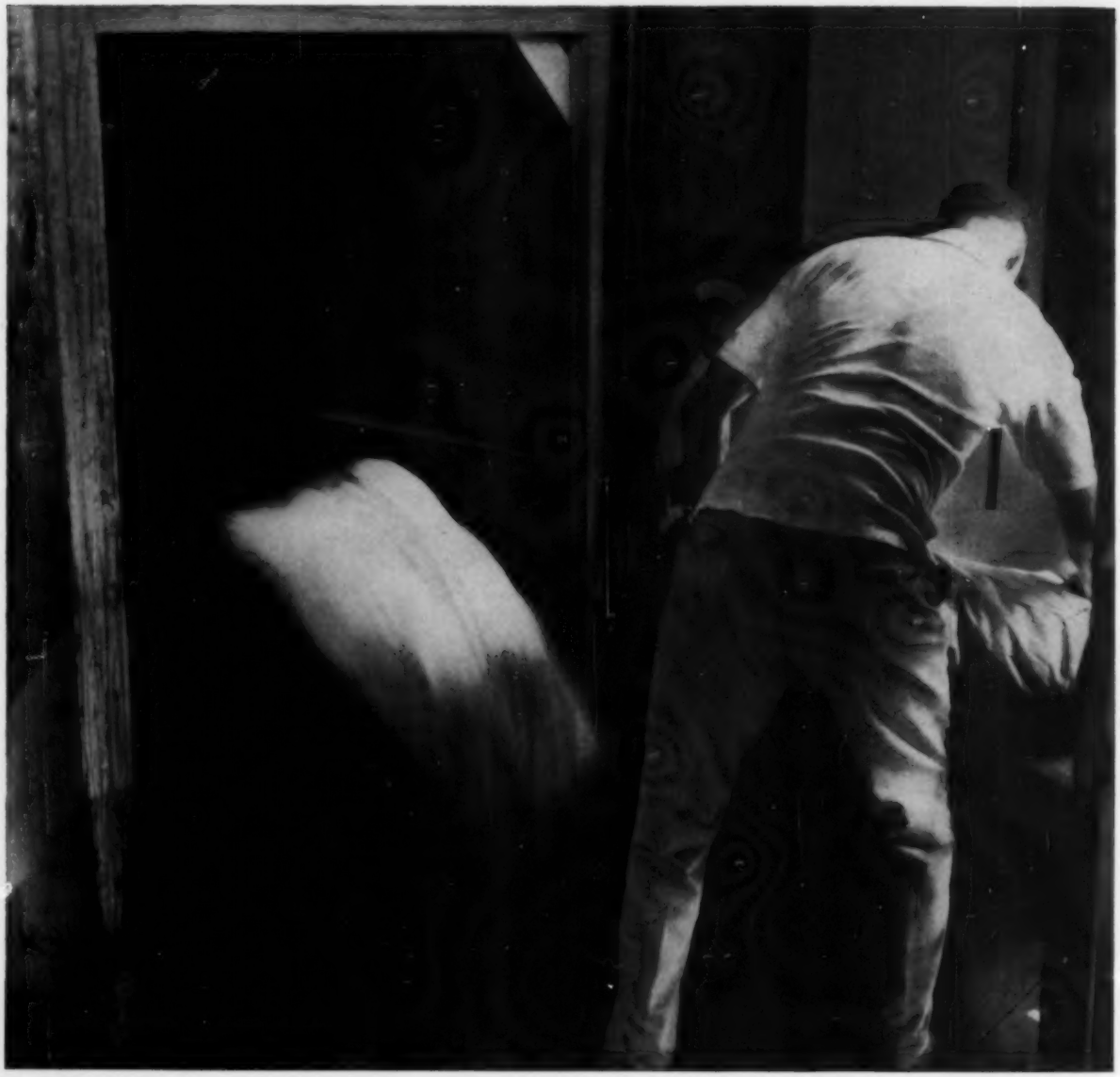
Special reports:

Aerial fertilizer applications on runway shoulders

Developments in weed control

John Gillis "Interview"

Marketing — a line or staff function?



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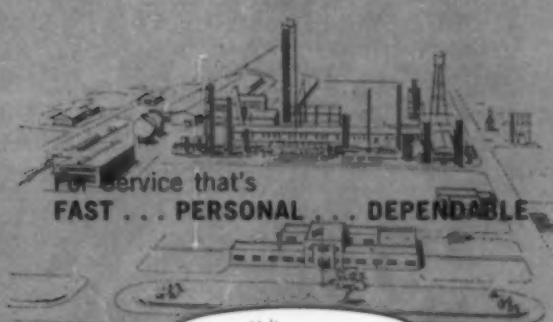

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THE COVER STORY

We're trying something new this month—an "FCMS Interview." Actually it's a careful gleaning of the outstanding question and answer session which followed the excellent talk by John Gillis, vice president in marketing, Monsanto Chemical Company. His talk was featured in our January issue. Gillis has been with Monsanto since 1933, becoming vice president of marketing in 1953. He is a member of the board of directors of Mobay Chemical Co., a joint subsidiary of Monsanto and Farbenfabriken Bayer of Germany, and also of The Chemstrand Corp.

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WASHINGTON VIEWPOINT

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- *For the first time gross farm income may hit $40 billion, net $13.5 billion.*
- *Aim of long-range and '61 programs is crop acreage switch rather than cutback.*

The farming business will get a $2 billion shot in the arm this year. This is the total to be reached by the end of the year, most of it to add up to an increase — not just relief calculated to make up for gaps here and there.

This is the President Kennedy–Agriculture Secretary Freeman program for agribusiness as it has unfolded so far and will continue. Officials have not put it in these terms, but a big increase in income for farming, spread out all along the line — including fertilizer sales — is how it all adds up.

Here's where the money is coming from and what it means to gross farm income, about 30 per cent of which represents the farmer's costs — which, in turn, is the amount of money the producer has to spend for all production purposes: federal money will be part of the $2 billions increase. Administered higher prices or just plain higher prices will bring in much of the rest.

Gross farm income of $40 billions for the first time should be the result. This would raise net income to about $13.5 billions. It compares with about $11.5 billion net which income has been averaging in recent years. Some experts think this is a bit high, but would still predict an increase to as high as $13 billions.

About $1.5 billions of the increase is considered in-the-bag, guaranteed by moves Freeman has made and other actions he will take or has taken to increase price supports. A good portion of the increases have been started without new legislation. Where efforts to get legislation fail, Freeman has other gimmicks up his sleeve he plans to use.

'61 Farm program is emergency action to boost farm business and rural areas until Congress can go to work on New Administration's long-range farm proposals. Kennedy-Freeman-Vice President Johnson team have been getting most of what they want — and will get more — on a very simple formula. Billions to boost city and depressed areas economy are also being proposed. Big city lawmakers who won't support farm legislation couldn't expect much help when relief favoring urban areas is proposed.

Major crops under support which have increased supports or allotments or both, or which will get them include: soybeans, dairy products, cottonseed, cotton, peanuts, rice, and flaxseed. Sugar beet growers are being allowed to expand plantings, likewise cane sugar producers.

Feed grains income is harder to predict compared to last year. The highest net increase feed grain growers were expected to get was about $400 million. This was based on difference between loss in new feed grain law cutbacks and increase in supports. But at same time, income in '61 was due to drop owing to ever lower market prices. The extent of sign-ups in the new program was also uncertain.

Net outcome of feed grains for '61, whether there had been an increase in support or not: income still somewhat higher than last year owing to (1) increased outlets for feed grains either in stepped up animal production and give-away programs or (2) higher price supports for corn, (3) there would have been some kind of feed grain program anyway. Cutbacks would have been induced by much higher supports on crops more in demand, such as soybeans, cotton and cottonseed and flaxseed.

A crop acreage switch is more the aim of '61 programs than a cutback on planted acreage. This also goes for a long-range program. The new, higher price support for soybeans alone is expected to divert about 4,000,000 acres to this crop. Comparable increases in other crops getting higher support are expected.

Wheat plantings status quo are assured now for the rest of the season. So no cutbacks here. The earliest this could happen is on the '62 crop, and that is no certainty either.

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LETTERS

INFORMATION WANTED

Manila, Philippines

The article "Standardization of Raw Materials" appearing in the January 1961 issue of FARM CHEMICALS makes mention of the O. K. Sparger (O'Neill-Kingsbury) under the sub-heading, Analysis Control.

We would like to know more about this sparger, and how we could obtain detail drawings of a typical installation. Could you help us along these lines?

Very truly yours,
W. S. GODINEZ
Resident Manager
ATLAS FERTILIZER CORP.

Write to: Edward D. Kingsbury, vice president, Kingsbury & Company, P. O. Box 7107, Brightwood Station, Indianapolis, Indiana.—ED.

Cincinnati 2, Ohio

We specialize in filtration and, therefore, are interested in articles on filtration, filter media, dust collecting, air conditioning (industrial), sieving and sifting.

Have you published any articles on these subjects during the past two or three years? If so, can you give us the titles of the articles and the dates of issues? Also, please tell us if back issues are available and the price per issue.

Are reprints available?

RUSSELL L. COOK
SNOW FILTRATION CO.

We're happy to tell you that we can send copies of three articles: 1) "Monitoring Fluoride Content of Air, Water, Vegetation," August 1960; 2) "Fume Control in Superphosphate Manufacture," and 3) "Clearing the Air," March 1959.

Atlanta, Georgia

In the January 1961 issue of FARM CHEMICALS mention was made of a booklet on granular potassium metaphosphate published by Scottish Agricultural Industries, Ltd. We would appreciate further information on how to obtain this publication.

Thank you for your assistance.

Very truly yours,
M. V. MANDERSON
Technical Director
Nitrogen-Phosphate Div.
ARMOUR AGR. CHEMICAL CO.

Address your request to T. R. Richardson, Scottish Agricultural Industries, Ltd., 39 Palmerston Place, Edinburgh 12, Scotland.—ED.

FINDS ARTICLES PRACTICAL

Montgomery, Ala.

. . . Let me take this opportunity to congratulate you on the fine service you are rendering through FARM CHEMICALS. Besides being interesting and informative, it always contains articles that are particularly helpful to us because of their practical nature . . .

G. R. WILLIAMSON
President
AGRICULTURAL CHEMICAL SERVICE CO.

Los Angeles, Calif.

. . . I want to compliment you on the consistently excellent editorial job you're doing. Your feature articles have been of great value to us and to many of our dealers. We hope your new management will continue the present editorial coverage of agricultural marketing and merchandising subjects.

LAWRENCE R. SMITH
Manager, Advertising
and Public Relations
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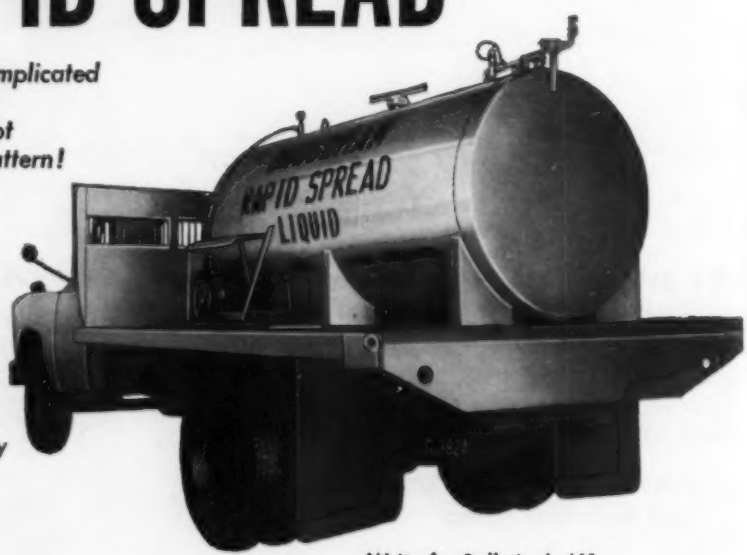

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COMMERCIAL SOLVENTS CORPORATION, AGRICULTURAL CHEMICALS DEPARTMENT, ATLANTA, SHREVEPORT, ST. LOUIS, CHICAGO, NEW YORK

WHAT'S DOING IN THE INDUSTRY

F
C

Acquisitions are in the news this month: John Deere Chemical Co. has purchased the mixed fertilizer business of the Ozark-Mahoning Co. Under terms of the sale, John Deere acquires the phosphoric acid-ammonium phosphate plants located near Tulsa on a 25-acre site adjacent to Ozark-Mahoning Co.'s sulfuric acid plant. Ozark will continue to own and operate the sulfuric acid plant and its extensive mining operations.

Summers Fertilizer Co. has acquired the manufacturing facilities, inventory and trade name of Aroostook Hi-Test Fertilizer Co., Presque Isle, Me. W. R. Edgecomb continues as general manager, Harry Trask as sales manager, and G. Noel Currie as plant superintendent of the operation, to be known as the "Hi-Test Division" of Summers.

J. R. Simplot Co. bought the Anaconda Co.'s Anaconda, Mont., treble superphosphate plant. President J. R. Simplot said the plant will be moved by rail and truck to Pocatello, Idaho, starting in June. The company previously had acquired Anaconda's Conda, Idaho, phosphate properties and had taken over operations at Anaconda of the grinding and preparation facilities.

International Minerals & Chemical Corp. has acquired Bioferm Corp. by exchange of 80,000 shares of IMC stock for all outstanding shares of Bioferm stock. Bioferm will operate under the Amino Div.

Last month, Food Machinery and Chemical Co. announced its purchase of Port Fertilizer and Chemical Co., Los Fresnos, Tex., and its companion Port Chemical Co., Elsa, Tex. Acquisition was made by exchanging an undisclosed number of shares of FMC common stock for all outstanding shares of Port Stock. Port will function as an associated operation of FMC's Niagara Chemical Div.

Niagara Chemical also has acquired certain assets of the Standard Agricultural Chemical Co., including a line of dinitro pesticides.

Petrochemicals Co. has named Theodore Riedeburg Associates as representatives in distribution and servicing of Petro WP pesticide wetting agent. Riedeburg Associates will serve users of Petro WP in the East, South and Midwest.

Last year, 53 fertilizer industry firms in 24 states, Puerto Rico and the District of Columbia contributed to the "Service to Youth" programs of the National 4-H Club Foundation. Dean R. Gidney, vice president of Potash Co. of America, took the leadership in developing the 1960 fund-raising project.

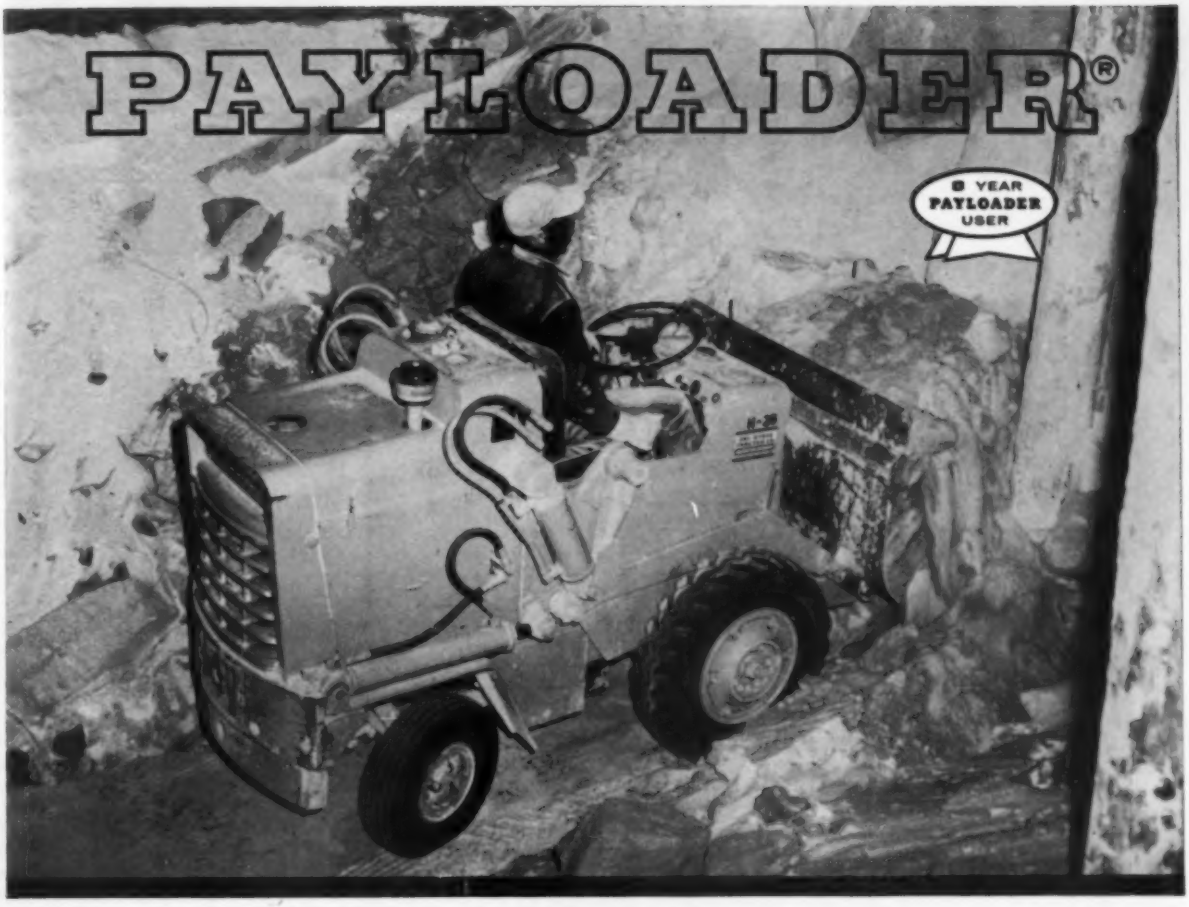
Henry Town Laboratories' new insecticide plant and sales office at 2121 Hy. 51 North, Madison, Wisconsin, are now in operation.

Principal plant diseases and pests which affect cultivation of vegetables in the Soviet Union, along with suggested control measures, are discussed in a publication translated from Russian and released through the Office of Technical Services, Business and Defense Services Administration, U. S. Department of Commerce, Washington 25, D. C. Coded 60-21165, it may be ordered for $1 from OTS.

"On the Mode of Action of Insecticides," a Russian article reviewing literature on DDT from both Soviet and non-Russian sources, also is available from OTS. It is Number 60-21161 and costs 50 cents.

"Results of 1960 Fungicide and Nematocide Tests" is now available. Issued annually by the American Phytopathological Society's Subcommittee on New Fungicide and Nematocide Data, the report gives information on new products available for testing, their composition and sources, and summarizes results of current projects. The report can be ordered for $1 from A. B. Groves, Winchester Fruit Research Laboratory, 2500 Valley Ave., Winchester, Va. Make checks payable to the Society. (There's an additional 25 cent charge on orders to be invoiced).

Bunker Hill Co. is now producing phosphoric acid at its new $2 million plant at Kellogg, Idaho. Designed by Dorr-Oliver, the plant has initial production capacity of 130 tons per day. The plant was completed last June, but its start-up was delayed by a 7½-month Mine-Mill union strike which ended late in December.



H-25 is more productive . . .

At Farmers Warehouse in Leary, Ga., annual production of chemical fertilizer averages 12,000 tons. Since 1952 this firm has used PAYLOADER tractor-shovels to unload boxcars, stockpile materials and feed the bagging operation. They owned 6 Model HA units in 1958 when they bought their first Model H-25 (2,500-lb. operating capacity) PAYLOADER. Plant Sup't. W. R. Owen, Jr., relates what has happened since:

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"FCMS Interview" with John L. Gillis

MARKETING: *Is it a line or a staff function?*

One of the understatements which creeps into each Farm Chemicals Marketing Seminar is:

"The question-and-answer sessions really pack a lot of information!"

This FCMS observer will go one step further to report that many times they are even more valuable than the formal presentations.

A question and answer session developed following John L. Gillis' talk at the 1960 Farm Chemicals Seminar (FCMS) which FARM CHEMICALS staff members feel is of sufficient interest to warrant special editorial treatment. Here are a few leading questions —answered by Mr. Gillis, who is vice president, Marketing, Monsanto Chemicals Co.

Q. Mr. Gillis, is marketing a line or staff function?

A. We consider it in every sense of the word, a *line* function.

Q. No staff duties at all?

A. Well, there are two types of activity. *First*, the activity that relates to the planning and the provision of services that makes it possible to do a better selling job. That's a *staff* function . . .

Q. Then the *planning* end of it you would consider a staff function and the *execution* of it would be a *line* function?

A. Well, I'd like to go into a little more detail. Our marketing of a product is the responsibility of the operating division and within the divisions the marketing function is considered a line function. We have a general staff department which is called the Marketing Services Department. This is a coordinating function in some areas and a *doing* function in others.

Such things as corporate advertising, industrial design and coordination of the operation of our district offices, study of the distribution methods, improvements and so on. This we consider a staff activity . . .

Q. You have the personnel *inside* the company—what reason do you have for inviting an outside marketing consultant?

A.—That's a very good question. We could have studied this problem (of reorganization) within our central group, but even the people in our central management have backgrounds which might conceivably influence their thinking. The man who made this study . . . was given the responsibility of coming up with an *objective* study, which we thought he accomplished very well.

Q. Where is Technical Service tied in with marketing in Monsanto's new Agricultural Chemical Division?

A. Technical Service reports to the Director of Marketing of the division. It's a separate department in the marketing section of the division.

Q. What about the introduction of new products — particularly in the first year. Does Technical Service apply here?

A. In our organization that is the responsibility of the development people. They take the product from research and they're responsible for its introduction into the field. Ordinarily the cut-off point is when the first significant commercial sale has been established, when the product is formally turned over to Sales. It becomes the responsibility of Sales and Technical Service can take it from there.

Q. Where does Quality Control fit in? To whom does it report or to whom is it responsible?

A. Our Quality Control reports to the Director of Manufacturing and it's an in-plant function, although they have close liaison with both research and marketing.

Q. Mr. Gillis, has the new full-line salesman encountered difficulty with varied distribution patterns or policies?

A. That's a tempting question. It would tempt me to get into something that would take about a half an hour to discuss, but we can't do that. One of the underlying reasons why our company set up a single division was that when we had divided marketing responsibility for inorganic and organic farm chemicals, each division was setting its own marketing policy and we found—to our embarrassment in a number of communities—that we were selling products carrying the Monsanto trademark *with different approaches.*

One of the divisions attempted to go to the distributor-dealer-farmer and the other attempted to by-pass the distributor and work with the strong dealer—or the one-step approach.

This is being resolved. It is very much of a problem and we hope that a year from now it will disappear.

I want to make it clear that we are evolving to a full line of selling. We have not arrived at it completely as yet. The division was only set up September 1, 1960. ☆

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POLICY DECISIONS

Needed to make the marketing concept work!

Is it easier—or more difficult—for a *smaller* company to adopt the total marketing concept? Since among the family of farm chemicals companies there is a majority of smaller companies, this question seems pertinent. FARM CHEMICALS has purposely brought up this subject before.

You'll recall that in the January issue Eugene B. Mapel, vice president of Chase Manhattan Bank and a speaker at the 1960 Farm Chemicals Marketing Seminar, said:

"The primary consideration is that all elements of the total marketing job are recognized, accepted and competently executed.

He said that "a large organization may have a specialist for each minute phase of marketing, while a small organization may make *one man* responsible for *all* elements of marketing."

Now this might seem to some to be easier—in blind reliance on the premise that the smaller number of people involved the more adequate will be communication and coordination!

Well, to discover the falacy of this statement, read what Dr. Henry Bund has to say about this . . . and the *decentralization concept.*

ACCEPTANCE of the new marketing concept on the part of top management has made great strides during the last ten or fifteen years.

Perhaps too much so!

Its genuine, as well as some imagined, benefits have been so universally recognized that many of us in executive marketing positions have been sorely tempted to move ahead too rapidly. And too often we do not give adequate consideration to the degree to which the rest of the corporate structure may be prepared to accept and live with us in marketing in our new and radically-changed role!

I'd like to quote here from the report on a very extended study of the marketing function which I undertook with several of my associates several years back:

"In a handful of companies we found the new marketing function approximately in the same position as the high-powered super-charged racing automobile caught in a snail's pace of suburban commuter traffic. No matter how great its potential contribution, there is no use building up and unleashing the abilities of a full fledged marketing team unless and until the rest of the business organization is both ready and willing to accept and work with what marketing is capable of furnishing."

Now this is an essential pre-condition, but assuming that a psychologically favorable climate for the acceptance of the marketing function has been created, we can next turn to the question of the mechanics for bringing marketing into closer alliance with the rest of the organization.

Since among the many members of the Research Institute there is a great numerical majority of smaller companies, I must inject here a comment which may have pertinence to some of you:

THE DILEMMA OF "SMALLNESS"

When it comes to facing up to the question of integrating marketing within the business, it is the *smaller company* that most frequently fails to give recognition to the problem—apparently in blind reliance on the fact that the small number of people involved, together with their close physical proximity, will assure adequate communication and coordination.

Perhaps some of you who work in a separate division of a large corporation have had the same experience.

The practical record of many of these companies strongly suggests that while this may be true in a few cases, the smaller operations—precisely because they do not accept the existence of a problem in this area—account for a disproportionately large share of both communications failures and inadequate coordination!

In most cases they, too, could benefit by reviewing and then adapting some of the more formal techniques which medium-size and large corporations are increasingly resorting to—in an effort to make certain that there is both better understanding and closer cooperation

Dr. HENRY BUND
Vice President
Research Institute of America

Condensed by Farm Chemicals from 1960 Farm Chemicals Marketing Seminar

across functional lines between marketing and other major divisions.

Now let's get down to the mechanics. We might well start with those approaches which are exclusively or predominantly originated by us in marketing—then move on to those instruments which require top management approval, coordination or even initiative.

First, to broaden the understanding of their personnel some executive heads of marketing go so far as to deliberately add personnel with engineering and manufacturing backgrounds, regardless of their specific qualifications for sales work.

Actually, such a move might make sense under certain relatively rare circumstances. Still, from our observations, we could conclude a great majority of marketing men do not believe this to be a constructive course.

The only exceptions anybody will allow are those rares instances where engineering and manufacturing play such a preponderant role in marketing itself that the marketing staff of necessity must include technically, highly qualified specialists. And that by and large does not apply to your industry.

Otherwise, it was pointed out that duplication of such technical talent on the staff of the marketing department tends to make coordination and cooperation more, rather than less, difficult.

Secondly, attendance at other departmental internal meetings is a far more common and more readily acceptable technique to broaden the understanding of each of the functions, responsibilities and difficulties.

The third technique is a geographic concentration of all top staff including marketing. This is apparently being increasingly recognized as a vital ingredient in many companies which are trying to create better integration and collaboration with their new marketing department.

Let me point out that this trend runs true to the tendency of many corporations within the last fifteen years or so to locate their main sales and marketing offices as close as possible to the geographic center of their chief market—while their manufacturing operations remain where they historically originated or at the site most logical from the standpoint of raw material, transportation or availability of the kind of labor skills which they need.

Now in a diverse group of companies—ranging all the way from paper products to plumbing and heating supplies—we encountered a tendency to move in exactly the *opposite* direction and require marketing personnel to operate out of the same location as the rest of the corporate staff.

Indications are that whatever sacrifice in convenience there may be involved here, such a move usually pays more, does more than just pay for itself by better integration of the company's total effort across functional lines.

The fourth technique—joint projects—will promote a better understanding across functional lines. It should be obvious that any such effort must be sold to all parties involved and that the time investment is justified in terms of the individual or department objectives.

One such successful experience is the case of the manufacturer of a certain line where samples of the new devices are prepared and taken out into the field for actual testing by a team which consists of three men from the factory—two from sales and one from engineering.

AN "AUTOCRATIC" APPROACH

Pretty much at the other extreme is the attitude of the successful sales executive who told us that they "insist that before any new person is put on—either the head of the department or an assistant—he must first spend two weeks in the field with the salesman."

Then again he insists "that every department head spend at least two weeks in the field twice a year. He may not necessarily be doing any selling, but he talks to field managers and salesmen. Getting out on a few calls he keeps his perspective and understands that his job depends on sales."

It apparently works quite successfully—thanks to the dynamic and almost overpowering leadership of one individual. It must be doubted quite seriously whether such a one-sided and somewhat autocratic approach would create more cooperation and integration than antagonism and resistance in many other companies!

Finally, the fifth technique. Much heavier reliance on committees is a definite, fast-growing trend. To be aware of the prejudices—many of them well founded—which most of us in executive positions feel and which experts in organization have expressed in recent years, we were particularly anxious to double check *every instance* in the broadening use of this device.

Starting with a somewhat skeptical attitude, we became, nevertheless, fully convinced that for entirely practical reasons, more companies are looking to committees to bring together and to help promote the integration between the various functions of their organization.

Interestingly enough—and we have more and more examples of this—in most of the larger corporations, and also in a growing number of medium-sized corporations, the tendency is to develop parallel committee set-ups at lower levels than the vice-president or division heads.

Another rather interesting innovation is the partial exchange of membership among internal committees by the main divisions of the business—production, marketing, engineering, finance, and so on.

There seems little doubt that a certain amount of waste motion and unnecessarily expended time is involved in the committee approach to coordination. On the other hand, the fact that these are spreading in the face of this opposition certainly seems to indicate that they are fulfilling a legitimate function of which there is no adequate substitute.

DECENTRALIZATION—PRO & CON

We must recognize that there is a real and growing trend to place the decision-making responsibility as close as possible to the actual seat of action.

Marketing is at least in step if not ahead of this trend—not only among industrial giants, but even in the relatively smaller companies. We found a genuine desire to delegate as much responsibility and authority as the capability of lower level personnel would permit.

Such moves, in the opinions of top management, more than pay for themselves by speedier, more realistic decisions in the current competitive battle.

Niagara's reorganization is a good

(Continued on page 56)

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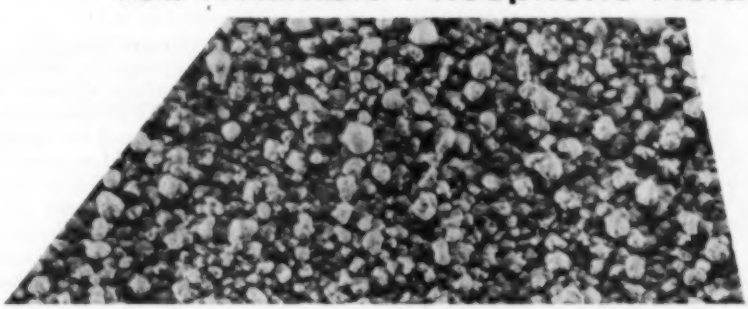

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Developments in weed control

By W. C. SHAW*

Outstanding progress is being made in the rapid development of chemical weed control methods in crops and specialized noncrop land areas . . . In our future thinking and planning we must give greater consideration to weed control problems on the farm as a farm unit rather than limit research techniques to the control of weeds in a single crop.

Two recent developments in research on new principles, methods and techniques may have far-reaching effects on chemical weed control. These advances include the development of (a) subsurface soil-incorporated, pre-planting herbicide application techniques and (b) the development of surfactants, carriers, solvents, co-solvents and other formulation adjuvants which influence initial as well as residual activity of herbicidal chemicals, These application and formulation techniques provide flexibility for influencing the selectivity associated with the herbicidal properties of the chemical.

The development of techniques and equipment for the subsurface application of herbicides as soil-incorporated pre-planting treatments or application at planting time will have a profound effect on the use of herbicides. A knowledge of the fundamental chemical and physical properties of new herbicides, especially vapor activity, will aid in determining the need for the subsurface application of such chemicals.

This application technique should provide increased flexibility in controlling deep-rooted perennials, annual weeds which germinate at greater depths in the soil, and weeds in small seeded shallow planted crops. Much additional research will be needed on these recently discovered techniques before their full impact is realized in improved principles and methods of weed control.

Outstanding progress is being made in the rapid development of chemical weed control methods in crops and specialized noncrop land areas. Only a few examples are given below to indicate progress and trends.

*Weed Investigations, Agronomic Crops—ARS-USDA, Beltsville, Md., Part of a talk presented before the Beltwide Cotton Production-Mechanization Conference January 11-13.

WEED CONTROL IN FIELD CROPS

The development of efficient, economical herbicides for improved chemical weed control in field crops has almost exceeded the imagination. Cotton can be used as an example to illustrate the potential for improved chemical weed control methods. EPTC has shown promise as a pre-planting soil-incorporated treatment, 3-(3,4-Dichlorophenyl)-1,1-dimethylurea [diuron] is being used as a pre-emergence treatment on a wide scale, and diuron, 2-chloro-4-diethylamino-6-isopropylamino-*s*-triazine [ipazine], and N-(3,4-dichlorophenyl) methacryl-amide have shown outstanding promise as directed post-emergence herbicides in cotton.

In sugarcane, the substituted *N*-phenylureas, the substituted *s*-triazines, the substituted phenylacetic acids, the substituted benzoic acids, the phenoxyalkylcarboxylic acids, TCA, pentachlorophenol (PCP), dalapon and other herbicides, can all be used to control specific weeds.

The *s*-triazines have shown outstanding potential for weed control in corn. The *s*-triazines and phenoxy compounds will also control a wide-spectrum of weeds in sorghum. The new herbicide 4-(2,4-DB) will make it possible to control broadleaved weeds in small grains underseeded with legumes on more than 36 million acres of crop land that could not be treated in the past because of the susceptibility of the legumes to 2,4-D and related herbicides.

A new herbicide, 3-4-dichloropro-

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*

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*Another 15th Century Symbol for Potash

weed control

(Continued)

pionanilide has given outstanding control of weedy grasses and broadleaved weeds in emerged rice. Amiben shows promise for weed control in soybeans. Several herbicide mixtures, including 4,6-dinitro-*o*-*sec*-butylphenol [DNBP] plus isopropyl *N*-3-chloro-phenyl) carbamate [CIPC], DNBP plus sodium 2,4-dichlorophenoxyethyl sulfate [sesone], DNBP plus Amiben, and other mixtures appear outstanding as early emergence treatments for weed control in peanuts. Trichloroacetic acid [TCA], dalapon, barban, 3-6-endoxohexahydrophthalic acid [endothal], and other herbicides add flexibility to the chemical weed control program in sugarbeets.

WEED CONTROL IN HORTICULTURAL CROPS

Equally striking advances in the development of improved chemical weed control methods have occurred in horticultural crops. The development of the substituted N-phenylurea herbicides for weed control in asparagus, mixtures of CIPC and CDEC for weed control in the cole crops, 4-(2,4-DB) for the control of broadleaved weeds in peas; the *s*-triazines for weed control in sweet corn and grapes; and the substituted phenylacetic and benzoic acids, and other herbicides for weed control in bulb crops are but a few examples of the progress being made. Pre-planting soil-incorporated treatments utilizing volatile herbicides such as the carbamates hold unusual promise for new chemical weed control methods in vegetable crops.

FORAGE CROPS, PASTURES AND RANGELANDS

Outstanding progress is also being made in the development of improved chemical methods of weed control in pastures and rangelands.

The development of EPTC as a preplanting soil-incorporated treatment for the establishment of alfalfa, red clover, white clover, birdsfoot trefoil, and other legumes; 4-(2,4-DB) and dalapon and combinations of these two herbicides for control of weeds in the establishment of grasses and legumes for grazing, dalapon and other herbicides for pasture renovation; 2,4-D, 2,4,5-trichlorophenoxyacetic acid [2,4,5-T], 2-(2,4,5-trichlorophenoxy) propionic acid [silvex], the substituted benzoic acids, and substituted phenylacetic acids for weed and brush control; the use of pelleted and granular formulations of the phenoxy compounds, benzoic acids, and phenylacetic acids for individual plant treatments; and 2,3,5,6-tetrachloroterephthalic acid and 0-(2,4-dichlorophenyl)-0-methyl isopropylphosphoramidothioate for weed control in turf—all are but a few examples of recent developments which provide wide flexibility in controlling a broad spectrum of annual and perennial herbaceous weeds and woody species in forage crops, pastures, and rangelands.

AQUATIC WEEDS AND NONCROP LAND AREAS

Excellent progress has also been made in developing techniques and equipment for evaluating new chemicals for their aquatic herbicidal properties. These techniques are already beginning to pay off in the discovery and development of improved herbicides in aquatic habitats. Herbicides such as 2,4-D, 2-methyl-4-chlorophenoxyacetic acid [MCPA], 2,4,5-T, silvex, 4-(2,4-DB) and the substituted phenylacetic and benzoic acids can be used effectively to control a wide spectrum of floating aquatic weeds. The aromatic oils, aromatic solvents and polychlorobenzenes have been supplemented by acrylaldehyde (acrolein), and the substituted phenylacetic and benzoic acids, 1,1-ethylene-2,2-dipyridylium dibromide (diquat), for the control of submersed weeds.

Soil sterilants which can now be used for the control of all vegetation on noncrop land and industrial sites have been developed. Soil sterilants with almost any desired residual activity in the soil can be selected. Such herbicides as the substituted *N*-phenylureas, *s*-triazines, phenylacetic acids, benzoic acids, and combinations of these compounds, when mixed with such chemicals as dalapon, amitrole, the phenoxy compounds, sodium chlorate, borax, and others will give immediate control of annuals with varying periods of residual weed control for all types of vegetation.

WEED CONTROL — A TOTAL FARM PROBLEM

In attempting to determine how research may result in better weed control methods for more efficient crop and livestock production, it must be recognized that we are now entering a new era which involves the utilization of various forms of energy—not only to control weeds but also to control insects and diseases and for crop protection and crop production in a wide variety of ways. Increasing emphasis on basic research and education programs will be required if we are to utilize the chemical energy of herbicides most effectively in the future.

There is increasing evidence that mechanical equipment will be used more and more in the future to transport chemical energy. The herbicides will be the sources of energy and they, rather than the machines with which they are applied, will perform the work. This does not imply that the need for mechanical equipment will be reduced. Quite the contrary. It means greater emphasis on specificity and accuracy in placing the chemical energy in the exact amount, in the exact place, and at the exact time for it to perform its maximum work.

We must keep in mind that weeds are a total farm liability and all crops grown on the farm are subject to their competition. In our future thinking and planning we must give greater consideration to weed control problems on the farm as a farm unit rather than limit research techniques to the control of weeds in a single crop. The cost of controlling weeds in a single crop undoubtedly appears high because only that crop is being considered rather than the total weed problem in all crops grown on the farm.

HERBICIDE ROTATION

To obtain a better balanced and more efficient weed control program in crop production, farmers must be encouraged not only to use chemical weed control methods for controlling weeds in the current crop, but to place greater emphasis on supplementing this program by the rotational use of herbicides on all tolerant crops throughout the rotation.

We also need to expand our studies on the possible rotation of different herbicides on the same crop grown continuously. Herbicides possess differential selectivity and specificity and rotating them will aid in preventing undesirable ecological shifts in weed populations and reduce the chance of an accumulation of herbicide residues in the soil.

We also need to learn more about the efficiency of rotating different herbicides on different crops throughout the rotation. This practice will permit continuity in the use of chemical energy to control weeds, and reduce weed seed populations in the soil.

Rotating different herbicides on the same crop grown continuously and full utilization of different herbicides on tolerant crops throughout a crop rotation established the sound principle of preventing undesirable shifts in the weed population, avoiding an accumulation of herbicide residues in the soil, and providing for the full use of chemical energy in combination with cultural practices to reduce weed seed populations in the soil. ☆

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INTERNATIONAL PAPER

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Figure 1. Operator at the Hubbard-Hall Chemical plant weighs out inert filler and active ingredient and adds them to the feed section of the Poulsen unit.

How the Hubbard-Hall Chemical Company uses

CENTRIFUGAL MIXING for quality p

THE Hubbard-Hall Chemical Company of Waterbury, Connecticut, manufacturers and formulators of agricultural dusts, wettable powders and aerial dusting powders, finds the Entoleter Centrifugal Mixer essential for the manufacture of quality products.

The problem faced by Hubbard-Hall is one all formulators have who blend a small amount of active ingredient with a much larger proportion of inert filler material—the need for thorough mixing throughout the final product. Active insecticide, fungicide and other chemicals are mixed in ratios as low as one to ten up to as high as one to six with inert filler. Any deficiency in the final dispersion of the ingredients will result in an inconsistent and inferior product.

The traditional manner in which pesticide ingredients are mixed is with a ribbon mixer. Some formulators use two successive ribbon mixers. However, according to Everett D. Marvin, Jr., Hubbard-Hall's assistant vice-president in charge of agricultural chemicals, the end product from a ribbon mixer will not pass the spatula test (streaks of unmixed active ingredient will show when a spatula is drawn over a small amount of the mixture). This means, of course, that the active ingredients are not thoroughly dispersed.

Hubbard-Hall was one of the earlier pesticide formulators to foresee stiffening competition and to take positive steps to anticipate this competition. The company purchased a Poulsen unit (made by Poulsen in Los Angeles) which is a combination of feeder, ribbon mixer, Entoleter Centrifugal Mixer, and bagger. In Marvin's words, the use of the Entoleter machine (made by Entoleter, Inc., New Haven, Connecticut) "puts us in a much more favorable competitive position. It is the most efficient and economical system we could find for a combination of mixing, particle size reduction, and deagglomeration."

THE WATERBURY OPERATION

The operation, as practiced by Hubbard-Hall in its Waterbury plant is: active ingredient is weighed out and added to the feed section of the Poulsen unit (see Figure 1) along with the inert filler material. A continuous conveyor elevator (Figure 2 shows the vertical return run of this elevator) elevates the material to the top of the unit. A selector valve diverts the elevated material so that it drops into the ribbon mixer (shown protruding from the rear of the unit in Figure 3).

After about ten minutes in the ribbon mixer, the material is discharged and a screw conveyor (not shown) moves the material back to the elevator. The material is elevated again, but this time the selector valve is positioned so as to divert the material into the Entoleter Centrifugal Mixer, (the motor and feed inlets of which are shown on top of the Poulsen unit in Figure 2). After passing through the Entoleter machine, product drops into holding bin immediately below and then into the bagging unit (shown in use in Figure 3).

The high-speed, high-energy centrifugal action in the Entoleter Centrifugal mixer (illustrated in Figure 4) breaks up any nodules or clusters of material in the mix, and produces an intimate, smooth-textured blend in which the active ingredient is completely dispersed.

During the eight years that Hubbard-Hall has had the unit, total maintenance on the Entoleter machine has amounted to the replacement of a single rotor.

Another problem, in addition to that of dispersing active ingredients, that the Entoleter Centrifugal Mixer solved for Hubbard-Hall arose during the formulation of Phygon wettable powders (used as fruit fungicide for apple scab and brown rot on peaches). One of the inert materials used with the Phygon is epsom salts. The first benefit received was particle size reduction of the rather coarse epsom salt grains—an action that would have been missed without the Entoleter unit.

MIXTURE IS HOMOGENOUS

And, to make the Phygon-epsom salts mixture dustless for safe handling, Hubbard-Hall sprays ethylene glycol onto the material during the ribbon mixer step. This moistening gives agglomerates and clusters in the ribbon mixer discharge—but the following step through the Entoleter machine breaks up all agglomerates and clusters to give a smooth, homogeneous mixture.

Figure 2. Top of Poulsen unit shows motor and feed inlets of the Entoleter centrifugal mixer, vertical return run of the continuous elevator and divided outlet from the elevator which can be diverted to send material to the ribbon mixer (right-hand leg of the outlet) or to the Entoleter machine (left-hand leg of the outlet).

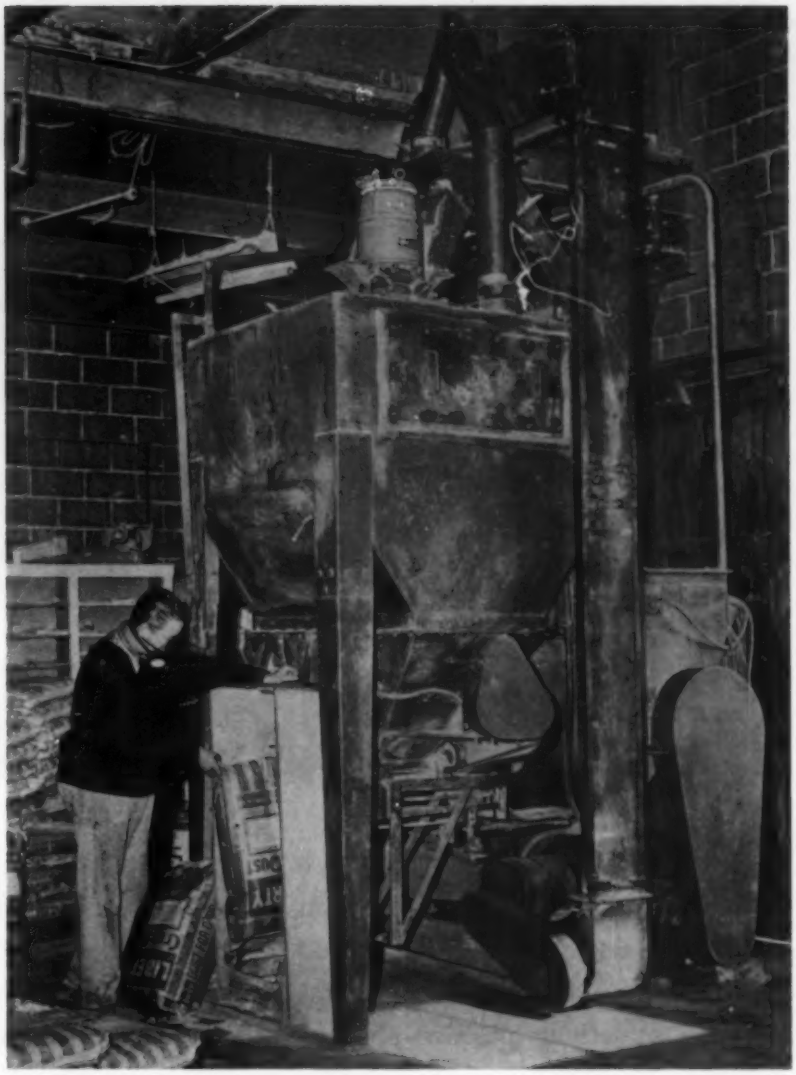

Figure 3. After the formulation passes through the ribbon mixer and Entoleter centrifugal mixer, it is fed into bags from the holding bin into which the Entoleter machine discharges. This full view of the Poulsen unit also shows the ribbon mixer located at the rear of the unit.

ityproducts

The Hubbard-Hall Chemical Company is the result of a 1957 merger of three agricultural chemicals companies into the Apothocaries Hall Company of Waterbury. Apothocaries Hall itself dates back to an original drug store of that name founded in Waterbury in 1849. Today, however, the company is no longer involved in the drug business.

Hubbard-Hall is a leader in the Northeastern agricultural supply industry as a regional distributor of finished goods for national manufacturers and as a formulator of agricultural dusts and wettable powders under its "Liberty" and "Double-H" brands and as a manufacturer of fertilizers at four southern New England locations.

As an indication of the breadth of Hubbard-Hall's agricultural chemicals activities, following is a list of some of the materials that they use in compounding their products: active ingredients include Parathion 25, Malathion, Captan, Phygon, Thylate, Sevin, Guthion, DDT, Chlordane, Endrin, and others; inert fillers include talcum, epsom salts, Pyrax, Silvacon, and others.

In addition, the company has diversified activities including the industrial chemical and metal finishing fields. It is affiliated with Connecticut Chlorine Products Company of Waterbury (a wholly owned subsidiary distributing chlorine) and Chem-Salts, Inc., of Atlanta, Georgia, (an affiliate company manufacturing chemical specialties for industrial use). ☆

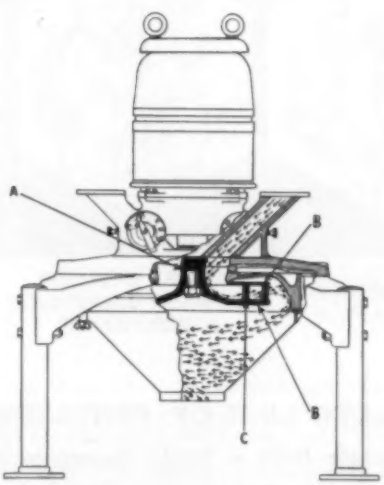

Figure 4. Entoleter centrifugal mixer utilizes high-speed, high-energy centrifugal action to give complete dry homogenization of the formulation ingredients. The dry material is fed, by the inlets and distributor, to the center of the rotor (A). The rotor consists of two steel discs (B) spaced about one inch apart by specially designed impactors (C). The material is spun out, by centrifugal force, into a thinning film as it approaches the periphery of the rotor. Powerful centrifugal action causes every particle of the material to be thoroughly processed, giving complete and uniform dispersion of the active ingredients in the final product.

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Flag man lines up the spray path for the pilot. One application cycle was completed every six minutes.

AERIAL FERTILIZER *applications*

By EARL G. JOHNSON*

AERIAL application of nitrogen fertilizer to 700 acres of runway shoulders greatly facilitated the execution of maintenance portions of a soil conservation and land management program at the Naval Weapons Industrial Reserve Plant, Calverton, Long Island, New York.

This 3000-acre tract of Navy-owned land is leased to the Grumman Aircraft Engineering Corporation as a testing facility and assembly plant for naval aircraft this company develops and manufactures. The fertilizer operations and other soil conservation measures mentioned in this paper were carried out by the Grumman Corporation. The Area Public Works Office, New York, assisted in a technical advisory capacity in planning the land management program and the annual maintenance increments.

A number of soil conservation measures were accomplished on this tract, but the semi-annual fertilizer applications, required to maintain vegetation on the runway shoulders, is the practice where recurring treatments are necessary. Aerial applications provided a practical economical method of treatment with the five-man maintenance crew. By means of plane, the time required was reduced from four weeks (800 manhours) to 12½ hours (62½ manhours.)

Not only is the aerial method much faster, easier and cleaner to handle, but also it has resulted in a saving in fertilizer cost. In addition, the applications have been made at the right season and with less disruption to the regular operations of the maintenance crew.

IMPROVEMENT WAS REMARKABLE

The improvement in grass cover resulting from these fertilizer treatments has been remarkable. The formerly thin stand of grass has flourished into a thick growth resisting both wind and water erosion. As a result, there has been a marked reduction in sand, grit and pebbles being blown or carried on to runways and other paved surfaces ready to be sucked into valuable jet aircraft. Grumman maintenance officials report that formerly ¾ cubic yards of these gritty particles were collected in daily sweeping operations. After improved shoulder vegetation only about a gallon of this material is recovered in the sweepings and most of this is small sand particles. The total area of runway and taxiway paved surface is approximately 5,000,000 square feet (115 acres).

Rilling and gullying of the runway shoulders, from water erosion, has been checked by the improved vegetation. Thus, a smooth, safe surface is assured as a safety measure in the event of accidental landing of aircraft on runway shoulders. Also, the areas are very much easier to maintain, general appearance is greatly enhanced, and the expense of perpetual repairing of eroded areas has been eliminated.

The origin of these rather extensive fertilizer operations dates back to 1956. Creeping red and alta fescue, originally established during construction, were rapidly thinning out. The sterile sandy soil has a low degree of cohesiveness and, consequently, accelerated surface flow from barren land, as well as paved areas, created numerous rills and gullies

Special Assistant for Soil Conservation and Erosion Control, Atlantic Division, Bureau of Yards and Docks/Area Public Works Office, New York, Department of the Navy. Paper prepared for delivery at the 1960 annual meeting American Society of Agronomy Land Use and Management Military Lands Subdivision. The opinions or assertions contained herein are the private ones of the author and are not to be construed as official or reflecting the views of the Navy Department, or the Naval service at large.

TABLE 1. COST ANALYSIS FOR AERIAL APPLICATIONS

(Based on 30% Nitrogen Solution)

1. Properties of Nitrogen Solution		
WT. per gal.	10.48 lbs.	(3.25 lbs. N)
WT. per 10,000 gal.	108,400 lbs.	(32,500 lbs. N)
	54.2 ton	(16.25 ton N)
2. Materials Cost		
Cost for 10,000 gal. (54.2 ton @$60.00 per ton) (Based on bid price in tank car lot delivered)		$3252.00
Cost per acre (Based on 10,000 gal. for 700 acres)		$ 4.65
3. Application Cost		
Aeroplane and pilot (1½¢ per lb. for 108,400 lbs.)[1]		$1626.00
5-man ground crew for 12½ hrs. (62½ manhours) (Based on $3.00 per manhour)		$ 188.50
Tank truck rental (Based on $50.00 per day for 3 days)		$ 150.00
Miscellaneous contingency expenses (estimated)		$ 100.00
Total Application Cost		$2064.50
Per Acre Application Cost		$ 2.94
4. Cost Summary (Materials and application)		
	Total	Per Acre
Materials Cost	$3252.00	$ 4.65
Application Cost	$2064.00	$ 2.94
TOTAL COSTS.....	$5316.00	$ 7.59

[1] The aeroplane is company-owned and operated. The charge of 1½¢ per lb. of material distributed is considered a realistic cost for application of spray material applied by a commercial applicator on large areas such as existed on the Grumman airfield.

ns on runway shoulders

On a 3,000-acre tract of Navy-owned land, leased by Grumman Aircraft, they're proving that aerial application is more economical, faster, easier and cleaner

in the runway shoulders. Continued repair to eroded areas was becoming a major expense item and maintenance mowings were almost impossible.

At the request of the Grumman Aircraft Engineering Corporation, through the Navy Bureau of Aeronautics (now Bureau of Naval Weapons), the Area Public Works Office, New York, developed a long range soil conservation program. Pursuant to BUDOCKS policy, technical advice was obtained from the New York State Office of the Soil Conservation Service, U. S. Department of Agriculture, on soils, vegetation and runoff control measures. Also, the New York State Conservation Department advised on forestry aspects. The technical advice and information obtained from these various sources were coordinated by the Soil Conservation Engineer of the Area Public Works Office, New York, who prepared the Long

TABLE 2. COMPARATIVE COST FOR GROUND APPLICATIONS

(Based on the use of Ammonium nitrate pellets, 33% N)

1. Material Cost		
48.75 tons Ammonium nitrate @$85 per ton		$4144.00
Cost per acre (Based on 700 acres)		$ 5.92
(48.75 tons Ammonium nitrate is the equivalent in Nitrogen of 54.2 ton of 30% nitrogen solution. The price, $85.00 per ton, is the estimated bid price for quantity sales).		
2. Application Cost		
5-man crew 4 weeks (800 manhours @$3.00 per hr.)		$2400.00
Equipment charge 4 weeks @$300.00 per week		$1200.00
Total Application Cost		$3600.00
Per Acre Application Cost		$ 5.14
3. Cost Summary		
	Total	Per Acre
Material Cost	$4144.00	$ 5.92
Application	$3600.00	$ 5.14
TOTAL COSTS.....	$7744.00	$11.06

AERIAL FERTILIZER . . . *(Continued)*

Range Land Management Plan.

This plan called for a number of erosion control practices and conservation measures including the rejuvenation of the 700 acres of grassed runway shoulders. In 1957 initial treatments of one ton per acre of ground agricultural limestone and 500 pounds per acre of 10-10-10 fertilizer were made by the Grumman Aircraft Corporation maintenance crews, after considerable extra effort.

In 1958, the five-man maintenance crew, operating two tractor-drawn, 10-foot spreaders, over a period of two months was unable to complete the follow-up application of ammonium nitrate (150 lbs. per acre) at the optimum season. Bad weather and soggy soil conditions greatly hindered operations. It was evident that success of the program was being jeopardized because of the difficulties and delays encountered in ground methods of fertilizer applications with the maintenance forces available. For these reasons, aerial applications were tried by the Grumman Corporation.

30% NITROGEN SOLUTION USED

The spring of 1959 the Grumman Ag-Cat Sprayer and Crop Duster was used. This plane is a highly maneuverable single engine bi-plane, built especially for agricultural purposes. (This plane is built for Grumman by Schweizer Aircraft Company, Elmira, New York.) Specifications for the plane include an overall length of 24 feet 8 inches, a gross weight of 3750 pounds, an empty weight of 2179 pounds and a 29 cubic foot (217 gal.) hopper volume. Maximum speed in level flight is 110 mph; stall speed is 42 mph. At maximum gross weights, take-off distance is 676 feet.

Instead of ammonium nitrate pellets, a 30 per cent nitrogen solution was used. The 30 per cent product was selected to avoid salting out in near freezing spring weather. In warmer weather, a 32 per cent nitrogen solution is possible. Specifications of the 30 per cent nitrogen solution are 42.2 per cent ammonium nitrate, 32.7 per cent urea, and 25.1 per cent water. It weighs 10.84 pounds per gallon. (3.25 lbs. N). The particular product used was URAN 30 manufactured by the Allied Chemical Corporation.

SPRAY OPERATIONS DISCUSSED

The nitrogen solution was delivered to the railroad siding of the Grumman plant at Calverton in a 10,000 gallon tank car. It was loaded into a tank truck by compressed air and trucked to the field site. The solution was pumped into the plane hopper with an ordinary construction pump. These transfer operations required a three-man crew.

The solution was applied at the rate of 13 gallons per acre, which provided 42.25 pounds of nitrogen. Each plane load carried sufficient solution for 10 acres or 130 gallons weighing 1380 pounds.

Two flag men were used in the field to line up the 45 foot spray path for the pilot. Every 6 minutes a full operation was completed including filling the plane hopper, take off, spraying 130 gallons of solution over 10 acres and landing ready for another re-fill.

The major delay was in waiting for the tank truck to re-fill after every 12 or 13 plane loadings. This time was found advantageous as a rest period for the pilot.

Initially, it took 25 hours to complete aerial fertilizer applications on the 700 acres. By the spring of 1960, the time was reduced to 12½ hours or 62½ manhours.

The cost for materials and aerial application are given in Table 1. The total materials cost was $3252.00 or $4.65 per acre. Application costs are estimated at $2064.00 or $2.94 per acre. The total costs for material and aerial application came to $5316.00 or $7.59 per acre.

Comparative costs for ground applications, formerly used, are given in Table 2. The material for a comparable amount of nitrogen costs $4144.00 or $5.92 per acre. Application costs were $3600.00 or $5.15 per acre. The total costs for material and ground application was $7744.00 or $11.06 per acre.

The savings by the use of aerial applications as compared to former ground applications are $2428.00 or $3.47 per acre.

Moreover, in addition to the direct savings, the advantage of more timely operations is highly beneficial. Also, the lack of disruption of regular work of the five-man maintenance crew is very important.

The cost figures are based on a 10,000 gallon car lot of fertilizer solution. Actually, only 9100 gallons is required. However, since the 10,000 gallon lot was purchased, this quantity was used as the basis for comparative cost analysis.

Aerial applications appear uniquely suited to runway shoulders or other similar large open areas of military land in need of fertilizer treatment. The flight lines are long, and the travel distances for plane re-fills is short. Usually, landing and take-off can be made from paved surfaces right on the site. Also, trucks supplying the fertilizer solution generally can travel to the site on paved surfaces. Thus, wet ground conditions do not hamper operations.

Conversely, grounds applications on large open areas of military land appear disadvantageous. Trucks and spreaders must travel considerable distance over land areas, frequently wet, soggy, or of uneven terrain, to remote corners of the field. Contractors for ground applications of fertilizer are not available everywhere and this was the case at Calverton, L. I., N. Y. Also, security frequently restricts the use of contract ground fertilizer application methods.

Important factors to keep in mind in the aerial application of fertilizer are: 1) Low wind velocities—10 miles per hour or less, are necessary. At Calverton, New York, early morning hours were generally the most favorable time. 2) The size of the job should be sufficient to take advantage of railroad tank car lots unless a source is readily available in smaller quantities at favorable prices. 3) Airfield or similar areas with long flight lines and open areas would appear to be the most advantageous for aerial application. Military grounds with numerous small areas, buildings, trees and other obstructions are not as well suited because of the probable added application costs and hazards involved. ☆

Aerial view of erosion damage to runway shoulders at Calverton, L. I., N. Y., before 1959. Long gulley in foreground and bare patches on runway were an annual maintenance problem. Aerial application of nitrogen solutions has checked gullying and rilling.

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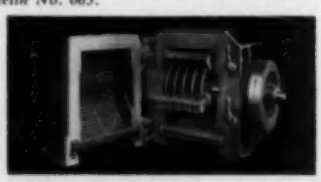

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**Reports Manager W. Carleton Merrill concerning Sturtevant Swing-Sledge Mill at James F. Morse Co., Boston.*

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Fertilizer Manufacturers Have a "Big Day" at University of Illinois

ABOUT 150 fertilizer manufacturers and their representatives gathered at the University of Illinois on February 2 to hear the latest research results and learn more about Illinois soil properties. University of Illinois agronomists presented the program.

CHANGES IN RECOMMENDATIONS

S. R. Aldrich, extension soils specialist, reported on changes in phosphorus and potassium recommendations. In the future, the suggested treatments for soils will be shown in actual pounds of nutrients rather than in pounds of superphosphate, triple superphosphate, rock phosphate, and muriate of potash. With this approach, nutrients can be calculated for any fertilizer rather than only individual fertilizer materials.

Aldrich also reported that phosphorus and potassium contents of fertilizers will also be reported on an elemental basis, as nitrogen is now indicated. He pointed out that P_2O_5 (phosphate) is about 44% phosphorus and K_2O (potash) is about 83% potassium. At some future date, fertilizer analyses will show only the elemental basis, but by using a dual listing in educational publications, fertilizer dealers and buyers will get acquainted with this terminology.

J. C. Laverty, in charge of the U. of I. soil testing laboratory, reported that 45 Class A commercial soil testing laboratories and 79 county extension laboratories are now operating in Illinois. He suggested farmers use the approved laboratories as their best source of soil test information.

BETTER TESTING METHODS

He reported the following improvements are now taking place in soil testing methods:

1) The visual test for acidity is being replaced with a pH test made by an electronic instrument. He stated that this method will cover the entire range from acid to alkaline soils and can be calibrated to give a direct measure of lime requirement. The pH test will also serve as a guide to the form of phosphate to use on individual fields.

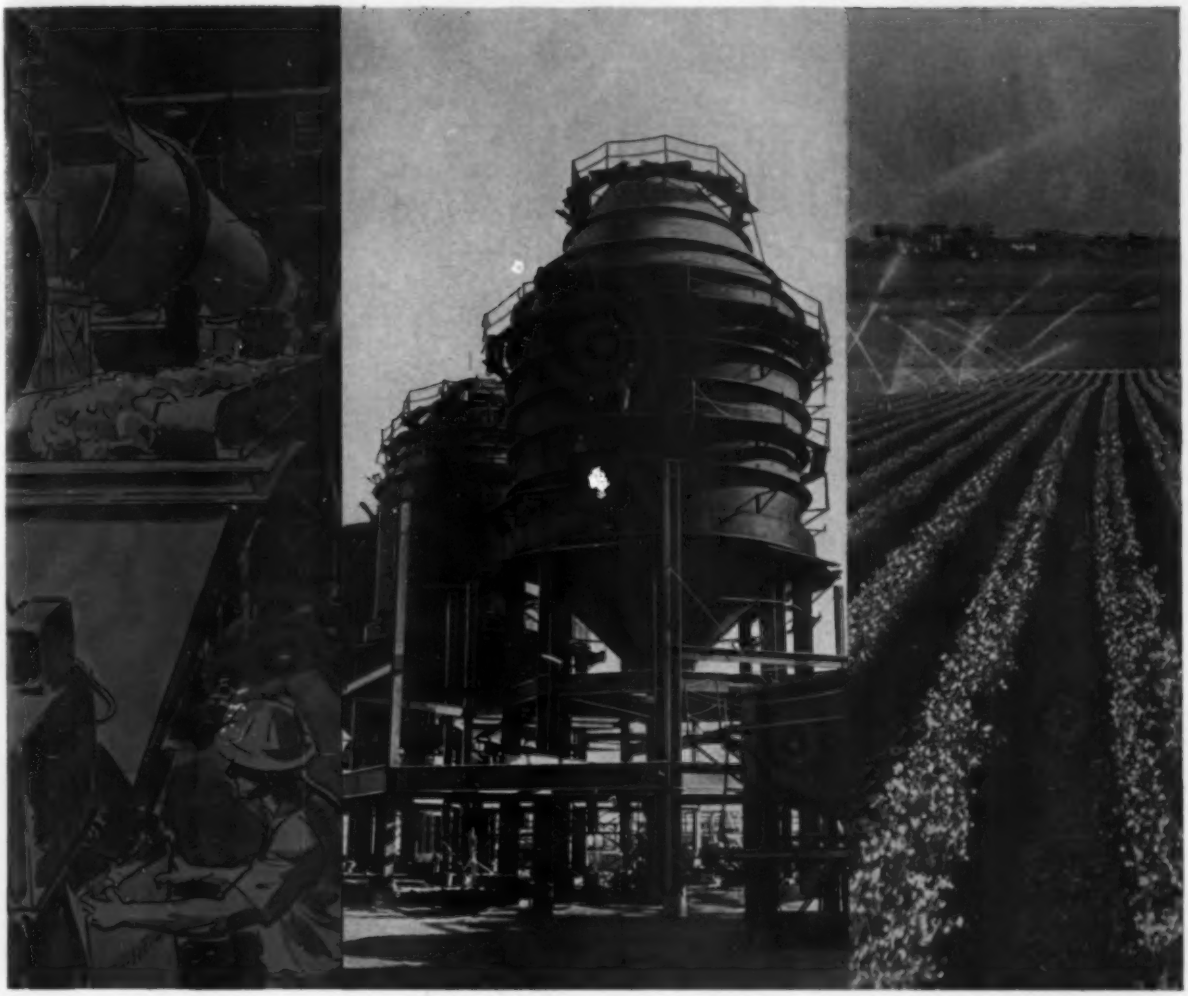
2) The photelometer method for testing soils for phosphorus is being introduced. An instrument will reduce human error and permit the introduction of a second phosphorus test. This second test (P_1) will enable the tester to determine the amount of phosphorus in the soil for use by crops during the coming growing season, Laverty reported. The P_1 test may be used as a guide for applying soluble phosphates. The old phosphorus test (P_2) will still be used as a guide for rock phosphate recommendations.

The new P_1 test is not interpreted in terms of high, medium, or low for the soil, but rather with respect to high, medium, or low for specific crops. So a given test might be low for wheat but high for corn or soybeans.

M. P. Britton, U. of I. extension plant pathologist, described the importance of the turf grass industry to fertilizer manufacturers. Dave Larson, research assistant, reported on a study of bulk application of fertilizers. Efficiency of nitrogen was discussed by L. T. Kurtz, and M. B. Russell, head of the Department of Agronomy, reported on activities of the department in relation to proposed changes in the Illinois Fertilizer Law. Characteristics of Illinois soils as media for plant growth were discussed by a team of U. of I. agronomists.

NEW LEADERS FOR GROUP

During the business session, the following officers of the Illinois Fertilizer Industry Association were elected: John Abbott, Ashkum Fertilizer Company, Ashkum, chairman; R. M. Morehead, Olin Mathieson, St. Louis, vice chairman; Roy B. Nethery, Federal Chemical Company, Danville, secretary; and Harold L. Stangel, Darling Co., East St. Louis, treasurer. Robert E. Weis, Virginia-Carolina Chemical Corp., East St. Louis, past chairman, presided over the business meeting.



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The FERTILIZER situation 1960-1961

Supplies are expected to increase four per cent over 1959-60. This year's report reflects the industry's optimism at a time when there is reduced activity in many other sectors of the economy.

TABLE 1.—NITROGEN: estimated supply of nitrogen for fertilizer purposes, 1959-60 and 1960-61, United States and possessions

(1,000 short tons of N)

Item	1959-60[1]	1960-61
Supply from domestic sources		
Solids:		
Ammonium nitrate [2]	433	456
Ammonium sulfate [3]	294	303
Urea	110	120
All other solids	256	302
Total solids	1,093	1,181
Liquids:		
Ammonia (including aqua)	841	891
All other	809	837
Total liquids	1,650	1,728
Total (solids and liquids)	**2,743**	**2,909**
Imports		
Ammonium nitrate	52	73
Ammonium sulfate	54	32
Urea [2]	12	18
Ammonium nitrate-limestone mixtures	26	20
Sodium nitrate	73	70
Nitrogen solutions	6	12
All other	75	65
Total	**298**	**290**
Exports		
Ammonium nitrate	21	8
Ammonium sulfate	51	49
Urea	16	32
Ammonia (including aqua)	66	92
All other	34	54
Total	**188**	**235**
NET DOMESTIC SUPPLY	**2,853**	**2,964**

[1] Revised. [2] Adjusted for estimated quantity going into non-fertilizer uses.

A report of the Agricultural Chemicals Staff
HAROLD H. SHEPARD, in charge
JOHN N. MAHAN, fertilizer specialist
CHARLOTTE A. GRAHAM, administrative assistant

Commodity Stabilization Service, Food and Materials Division, USDA, Washington, D. C.

SUPPLIES of fertilizers for 1960-61 are expected to total 8,293,000 tons of plant nutrients—nitrogen (N), phosphate (P_2O_5) and potash (K_2O)—an increase of 4 per cent over 1959-60.

This report reflects the optimism of the fertilizer industry at a time when activity is at a reduced level in many other sectors of the economy. Estimates in this report, however, are based on stock trends, rates of production and foreign trade during the first six months of the fertilizer year in relation to the same period in other years. If these estimates are as realistic as they seem, a tight supply situation might arise this season because production schedules usually are not flexible enough to meet a sudden upsurge in fertilizer shipments. Changes in agricultural legislation or programs could have an effect on fertilizer trends.

Incredibly large quantities of fertilizers move to farms in a growing number of forms during any extremely short planting season. Weather conditions determine the start, interruptions, and even close of the season. Handling and transportation facilities become loaded to the limit. Timing influences farmer's preferences for particular kinds and forms of product. Spot orders result from unanticipated needs and many of these may remain unfilled during the busiest part of the season. More than at any time since the early 1950's, farmers this year would be wise to place their fertilizer orders well in advance of application to assure themselves of supplies of specific products.

NITROGEN (N)

Supplies of nitrogen for fertilizers for the 1960-61 year are expected to total 2,964,000 tons of N, up 4 per cent over the record 1959-60 supply (table 1).

Production of anhydrous ammonia and fertilizer grade

(Continued on page 34)

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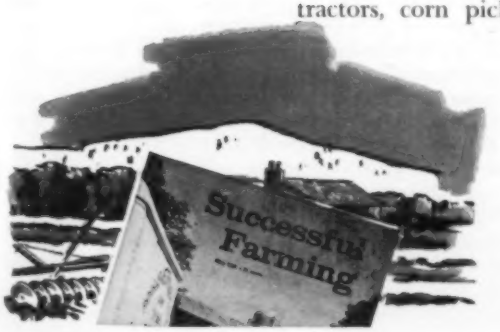

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The FERTILIZER situation

1960-1961 *(Continued)*

ammonium nitrate solution—basic nitrogenous materials—is again at record levels. Separately, in combination, or one or both supplemented with urea, these constitute about 60 per cent of the total domestic nitrogen supply. A 6 per cent larger supply of anhydrous ammonia for direct application and use in mixed fertilizers is expected to be available this year. Exports of ammonia are expected to increase 40 per cent over 1959-60. The supply of nitrogen solutions will rise nearly 4 per cent, with imports expected to double. Some increase in exports of solutions is included in the figure for "all other" nitrogen.

About 5 per cent more solid ammonium nitrate will be available than a year ago due to increases in production and imports, and further curtailment of exports.

Ammonium sulfate production was down about 69,000 tons of N content in 1959-60 from the previous year due to the steel strike and decreased synthetic production. Yet June 30, 1960, inventories of primary producers totaled 195,736 tons of material against 72,342 tons at the previous year's end. In the current year, by-product ammonium sulfate production is lagging behind normal levels because of reduced output of the steel industry's cokeoven, while producers of synthetic are operating only at about the same level as last year. Production plus stocks, however, should provide about 3 per cent increase in domestic material. Indications are that ammonium sulfate of exact specification as to granule size, etc., is in tight supply. This may reduce the competitive position of other ammonium sulfate because imports in the first half of the year lagged and exports were about the same. These circumstances may encourage shifts to other forms of nitrogen.

Urea production was down about one per cent during the first half of the year but is expected to pick up during the second half. Imports were up about 50 per cent; however, it is estimated that less than 40 per cent of imported urea goes for fertilizer even though it is imported under that classification. Exports during the first five months of 1960-61 were about 3½ times those of last year; prospects for the last half of 1960-61 indicate urea exports for the whole year will be about double those of a year ago.

Increased production of ammonium phosphates, nitric phosphates and ammonium nitrate-limestone is expected to raise other unspecified solid nitrogen carriers 16 per cent over last year.

Anhydrous ammonia capacity continues to grow through expansion of existing plants and construction of new ones. About 453,000 tons of N capacity will be added to the present 4.3 million when six new plants are completed. In addition, a number of other plants are being expanded or have expansions scheduled for over 160,000 tons of N.

TABLE 2.—PHOSPHATE: estimated supply of P_2O_5 for fertilizer purposes, 1959-60 and 1960-61, United States and possessions

(1,000 short tons of available P_2O_5)

Item	1959-60[1]	1960-61
Supply from domestic sources		
Normal and enriched superphosphate	1,329	1,264
Concentrated superphosphate	916	1,019
Ammonium phosphate [2]	232	298
All other [3]	351	384
Total	**2,828**	**2,965**
Imports		
Ammonium phosphate	56	56
All other	26	25
Total	**82**	**81**
Exports		
Normal superphosphate	36	27
Concentrated superphosphate	112	120
Ammonium phosphate	20	48
All other	9	9
Total	**177**	**204**
NET DOMESTIC SUPPLY	**2,733**	**2,842**

[1] Revised. [2] Liquid and solid ammonium phosphate shipped as such by primary producers. [3] Includes ammonium phosphate (produced in combination with potash salts to make mixed fertilizers), nitric phosphates, sodium phosphate, wet base goods, calcium metaphosphate, natural organics, phosphate rock and colloidal phosphate, basic slag, and estimates of wet and furnace phosphoric acid for liquid and solid mixed fertilizers and direct application.

TABLE 3.—POTASH: estimated supply of K_2O for fertilizer purposes, 1959-60 and 1960-61, United States and possessions

(1,000 short tons of K_2O)

Item	1959-60[1]	1960-61
Supply from domestic sources		
Potassium chloride	2,383	2,455
Potassium sulfate [2]	127	132
All other	20	20
Total	**2,530**	**2,607**
Imports		
Potassium chloride	219	200
Potassium sulfate [2]	39	28
All other	24	25
Total	**282**	**253**
Exports		
Potassium chloride	395	350
Potassium sulfate [2]	15	15
All other	8	9
Total	**418**	**374**
NET DOMESTIC SUPPLY	**2,394**	**2,486**

[1] Revised. [2] Includes sulfate of potash-magnesia.

PHOSPHATE (P_2O_5)

Domestic supplies of P_2O_5 for fertilizers in 1960-61 are expected to be 2,842,000 tons, 4 per cent more than in 1959-60 (table 2).

Supplies from domestic production will be up 5 per cent but imports will show little change and exports will probably be up 15 per cent.

Normal and enriched superphosphate supplies are expected to be down 5 per cent from 1959-60. Exports are likely to drop 25 per cent.

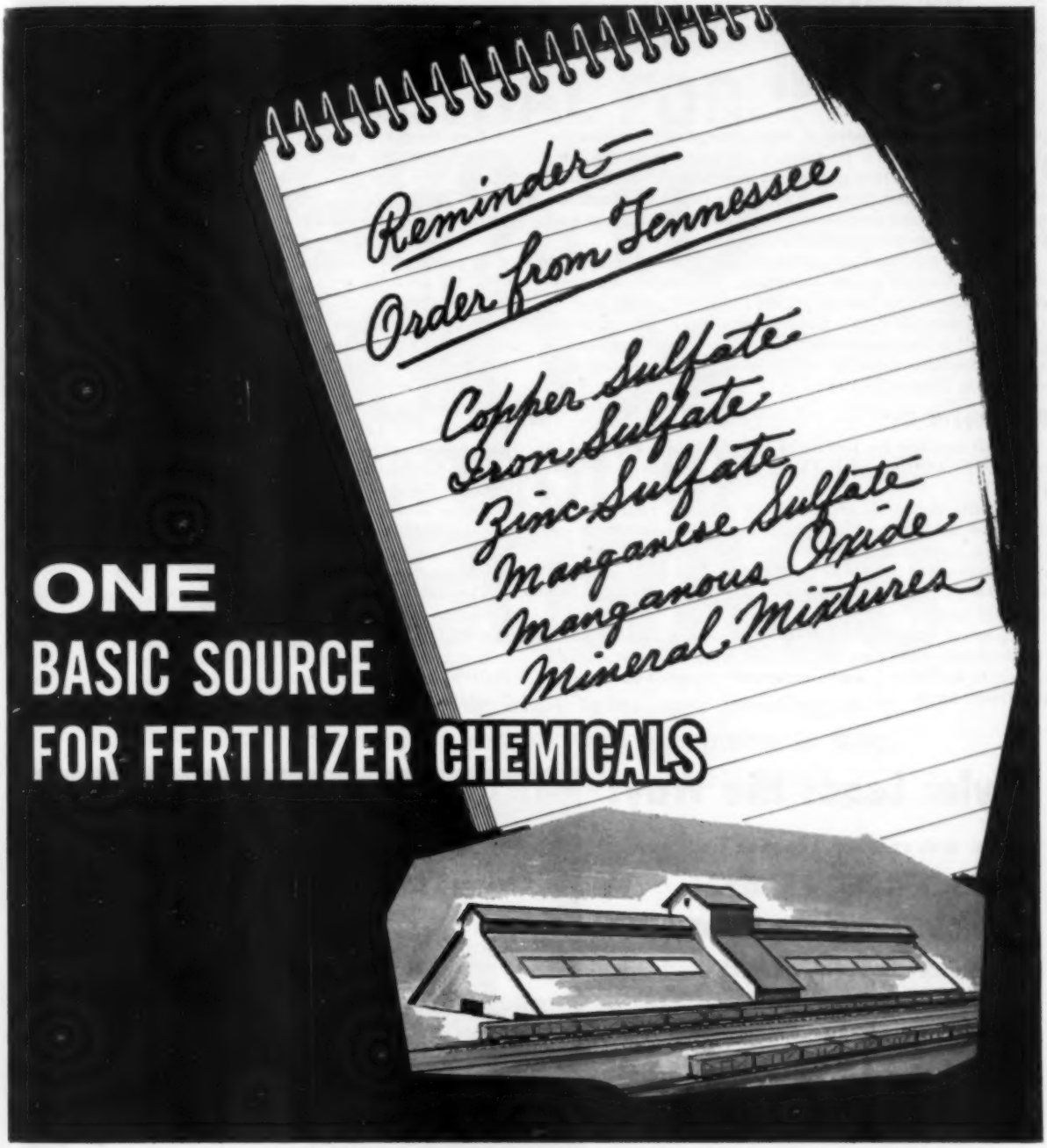
Concentrated superphosphate production will be up over 10 per cent. Heavy exports in the fall are expected to taper off to a 7 per cent increase for the year.

Shipments of ammonium phosphates by primary producers will be up 28 per cent over 1959-60. Imports are expected to be about the same as last year. Exports will probably be more than double those of last year and leave a net gain of less than 40,000 tons of P_2O_5.

Supplies of all other phosphates will increase 11 per cent. Wet-process phosphoric acid production is at a record level—220,000 tons of P_2O_5 over last year. Furnace acid is up 10,000 tons of P_2O_5. Use of phosphoric acid for direct application and in liquid and solid mixed fertilizers in 1959-60 totaled an estimated 170,000 tons of P_2O_5.

A share of the extra phosphoric acid will go into increased

(Continued on page 36)



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The FERTILIZER situation

1960-1961 (*Continued*)

production of concentrated superphosphate, ammonium phosphates, and nitric phosphates with some acid available for expansion in direct application and use in mixing plants. Indications are that there is a softening in the non-fertilizer market for furnace acid which will result in additional acid from this source going to the fertilizer industry.

Scheduled construction and expansion in the period 1960-62 (some of which is now on stream) will swell wet-process acid capacity 46 per cent above the January 1, 1960, level of 1,348,300 tons of P_2O_5. Concentrated superphosphate capacity will be increased more than 25 per cent and ammonium phosphate capacity will become nearly double that existing on January 1, 1960.

POTASH (K_2O)

Potash supplies for fertilizers in 1960-61 are expected to total 2,486,000 tons of K_2O, up 4 per cent over 1959-60 (table 3).

Domestic deliveries of potassium chloride (muriate) to the States during the first half of the year were off 20 per cent from the same period last year. Movement during the spring season is expected to bring the total for the year ahead of 1959-60. Potassium sulfate is expected to be up 4 per cent over last year.

Imports of muriate will be down 10 per cent and potassium sulfate down more than 25 per cent from last year. Mixed fertilizers and other potash carriers are expected to continue at 1959-60 levels.

Even though a record production was attained last year, a record domestic and export movement reduced stocks to 73,000 tons of K_2O on June 30, 1960, whereas stocks have been 473,000 and 261,000 tons respectively in 1958 and 1959. Deliveries in 1960-61 must come from current production; hence a seller's market appears to be developing in potash.

Exports of potassium chloride the first five months of 1960-61 were 76 per cent larger than the same period in 1959-60. The rate during the remainder of the year may have to be decreased materially because anticipated needs at home are nearly equal to current production. As a result, exports for the year are likely to be reduced to 11 per cent below 1959-60. World supplies reportedly have been reduced by a slow-down strike at French mines and by a mechanical breakdown at a Spanish mine. Because of the world supply situation U. S. producers have a more favorable export market but may not be able to take full advantage of it because of domestic needs.

Three producers have expansions underway. One producer is building a plant in Utah, scheduled for completion in late 1962, that will increase U. S. potash production capacity over 25 per cent.

The first potassium nitrate plant in the United States directed to the fertilizer market is scheduled on stream in late 1961.

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SPECIFICATIONS

Body Weight Approx.	1400 lbs.
Hopper Dimensions	60" x 84"
Wheel Track	74 inches
Axle Rating	4000# each axle
Type Axle	Tandem Torsion Spring
Fans	Angled Twin 19 in. Dia.
Wheel Bearing	Sealed Timkin Bearing
Capacity	2½ Ton
With Body Extension	19in. 4 Ton
Spread Pattern	Approx. 45 Ft.
Spread Capacity Pr. Hr.	30-60 Acres
Field Speeds	
6 M.P.H.	30 Acres Pr. Hr.
12 M.P.H.	60 Acres Pr. Hr.
18 M.P.H.	90 Acres Pr. Hr.
Highway Speeds	up to 60 M.P.H.

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Crabgrass and other annual grasses, plus certain annual weeds which plague growers, can now be positively controlled. This is the achievement of Diamond's new Dacthal—a 50% active concentrate wettable powder. It's a pre-emergent herbicide which attacks the weed seed and kills it. Apply early in Spring or following cultivation.

Dacthal, the new herbicide which offers this superior control, has been thoroughly tested for three years by Diamond, by government and university experiment stations. It provides the real answer to the control of crabgrass and many other annual grasses; purslane, Florida pussley, carpetweed, common chickweed and lamb's-quarters. Definitely more effective than previously available crabgrass killers.

Diamond's Dacthal is ready now for safe, sure use on ornamental nursery stock and orchards. See your Diamond Chemical distributor. Or, for more information, write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals

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PRECISION FERTILIZER DISTRIBUTOR

Simple in design yet robust in construction, the LELY Distributor's exclusive design features assure accurate and uniform spreading of all types of material—fertilizer, lime, seeds, pelletized 24D etc. Spreading range is fully adjustable, from 5 lbs. to 1500 lbs. per acre, with an effective spreading width up to 50 ft. (Does 25 acres an hour). Now available in 3 models—3-point hitch P.T.O. driven (illustrated), Tow type ground driven and Tow type P.T.O. driven. Hopper capacity 1000 lbs.

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Sprayer rental is a profitable service offered by many fertilizer and ag chemical dealers. Whether you charge equipment rental by the hour or by the acre, you profit both from the sale of material and the equipment rental fee.

CENTURY'S self-propelled sprayer gets the job done accurately and without trouble because it is engineered for just such rugged performance. Nylon nozzles handle all chemicals, even liquid fertilizers. So does the 150 gal. fiberglas tanks. It works equally well in low or high crops. An inexpensive trailer transports it easily at highway speeds. Find out how CENTURY can help you sell more chemicals and liquid fertilizer by offering sprayer rentals to farmers in your area. Write today for free 20-page information booklet to: CENTURY ENGINEERING CORPORATION, CEDAR RAPIDS, IOWA. Dept. 154-D

Wet Process Acid Use is on the Rise

DEMAND for wet process phosphoric acid for use as a fertilizer is on the increase. Before World War II, annual production was 120,000 tons. After the war it increased to 400,000 tons annually. In 1958, 1,070,000 tons were produced and the estimated 1960 production was 1,300,000 tons, T. P. Hignett, Wilson Dam, Ala., said in a paper, Manufacture of Wet-Process Phosphoric Acid, presented at a symposium during the 44th National Meeting of the American Institute of Chemical Engineers, February 27, in New Orleans.

Wet process phosphoric acid, made by the reaction of phosphate rock with sulfuric acid, is used principally for production of fertilizers, whereas phosphoric acid produced in electric furnaces is used principally for chemical and food products. Since 1952 production of wet-process phosphoric acid has outstripped furnace-produced acid and in 1958, production of the latter was about 400,000 tons less than the wet process.

More Plants to be Built

As the average production increase of wet process acid is about 110,000 tons a year, and several new plants are under construction and plans to build others have been announced, it appears "that the rate of increase is not slacking."

"The increased production of wet-process acid reflects not only the increased demand for phosphate fertilizers but also a change in the type of fertilizer," the paper observed . . . "From 1910 to 1950, 80 per cent or more of the phosphorus in fertilizers was in the form of ordinary superphosphate . . . Since 1950 there has been a strong trend toward high-analysis granular fertilizer which requires concentrated phosphate materials. For this reason, the percentage of phosphatic fertilizer supplied for ordinary phosphate has declined sharply since 1950. In 1960, ordinary superphosphate constituted only 48 per cent of the phosphatic materials supplied for use in fertilizers . . . The remaining 52 per cent . . . were principally products made with phosphoric acid . . ." ☆

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With changes coming at a startling rate in the fertilizer business, just keeping up with them can be a problem. But Sohio keeps its customers ahead of the trend to high-analysis fertilizers by tailoring solutions to the times.

Sohio specialists who work with you match your requirements from a full line of Sohiogen solutions and Sohio nitrogen materials — ammonia, ammonium nitrate, and urea — blended to a wide range of chemical and physical properties.

Technical help. The right material for your job. Johnny-on-the-spot delivery. All add up to fewer problems and lower production costs at your end of the line. Ask your "Man from Sohio" for the full story.

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- Higher fixed-to-free ratio solutions (solutions containing higher ratio of salts to ammonia).
- Development of new solutions to satisfy specific needs for higher fixed-to-free ratio solutions.
- Addition of urea to lower saturation temperatures (making it possible to use special solutions).
- Full technical assistance and service in using more solutions for production of fertilizers.
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What the MANUFACTURER *can do for the* DEALER

Part III—HOW TO HELP

Before planning your sales program, find out what your dealers REALLY want. Go to ten good dealers to determine what things they have in common, says the author. From this a general pattern can be made up and you're on your way.

By F. E. HARTZLER

In the last article we covered, basically, the various areas, the differences between the dealer and manufacturer, and provided a sample questionnaire of how to find dealer needs.

Now let us assume that you called in your marketing manager, that he altered the questionnaire to fit your situation, and that he now has several hundred returns. Now he is ready to make up a summary.

The first item of information, why dealers like your product and why they buy from you, may surprise you considerably, and it will certainly help your salesman. Along with this you may be interested in what they like about your competitors.

But the other area in which you should be most interested is that area of business in which they desire help.

This, too, may surprise you considerably, and it should change many of your dealer programs. It is not hard to put together a hellza' poppin' sales program. You know the kind—let's whoop and holler and sell the heck out of things. If you serve enough free liquor you might even get a pretty good attendance. However, your dealers probably feel that they need something else entirely. This summary of the questionnaire returns will show what they want.

The reason for the popularity of sales programs is that this is always the manufacturer's interest. But sales without profit, sales to poor credit risks, and sales that are not right don't help a dealer at all.

Let us suppose that you have found three areas in which your dealers sincerely want help—perhaps in the area of credit. There are several avenues that you can take:

1) Call in an expert for a short course.

2) Use someone from your own staff to direct the course.

3) Select a good dealer to direct the course.

All of these have the same fault—they are one man's opinion. This is perfectly all right; there is nothing wrong with one man's opinion and for him it may be the perfect thing to do. But individuals differ considerably in their make up and what they can and what they cannot do.

ASK TEN GOOD DEALERS

It would be better to go to ten good dealers to determine what things they are doing in common. There will be some differences due to the fact that individuals differ, but primarily they will be doing pretty much the same things. The job of the man in charge of the program would be to select the common things, the sort of things that nearly anyone can do. From this series of calls a general pattern should be made up. This general pattern should include even the forms that seem to work best. It should include enough detail so that it will make sense.

Now you have some good field information. You must be prepared to have a short session, produce a small manual, and then have your salesmen sit through and be trained to advise dealers.

Be prepared for trouble. Salesmen may not like this sort of thing in the beginning. Somebody's pet peeves are likely to get stepped on, but then it's awfully hard to scramble an egg to suit customers without breaking the shell. The upper management of the company, itself, should be acquainted with the program and they should be willing to see to it that it is carried through.

WHY MUST WE DO THIS?

Next comes the question: Why must the manufacturer do this? Could such a program be handled by the colleges? Is there a governmental agency that could do it? The answer to both is, "Yes, but . . ." Yes, but you may not like the results. After all, there is no one who knows your business as well as you do. In addition to this your own peculiar situation as a manufacturer and your own relationships with your dealers will determine how far you want to go. One final factor involved would be that you may not want to divulge your future marketing moves to anyone else in order to secure training.

Actually, the manufacturer is the only one who can do this sort of training well. He is probably the only one who can really select good dealers, and there is an important element of selection involved when he selects his own ten best dealers. His ten best might not be somebody else's ten best. Each manufacturer has his own needs.

The dealer himself is helpless in this situation. He only knows what he has done, and he is in some respects incapable of judging whether or not he has done this well. He needs the opportunity to measure his performance

Electron micrographs showing plate-like Micro-Cel E and spherical Micro-Cel B structures.

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against others in similiar situations. Only by this sort of program can he tell how well he is doing.

Furthermore the dealer himself may be handicapped by an agricultural background that taught him nothing at all about merchandising. He knows more about how to help the farmer than he does about how to help himself. Even now I hear about training every dealer to be a farm manager. Great, but first let's teach him how to be a *store* manager.

The time has come for the manufacturer to realize that whether he likes it or not he is going to have to get into distribution. He will in many cases have to learn it from scratch.

In training of this type, one thing to avoid is glittering generalities. For example, as a controller for two small companies, one would not be interested in general controllers' problems. Instead specific answers to specific questions in two lines of business would be needed such as information about a tax ruling regarding urban renewal. Your people want problems answered and answered specifically, so in training schools steer clear of general principles. After all, there is only one—buy low, sell high, but this doesn't help much does it?

SELECTING THE METHODS

Usually training falls into four steps. These are:

1) Preparing
2) Presenting
3) Applying
4) Follow-up

For purposes of preparing the people to learn this new step any good stem winder is useful. He can show the need, point out why this must be done. If enthusiasm has any place in a training program, this is the place for it.

The presentation. This should be done carefully and slowly and with lots of visual aids. Here is the place for the flip chart, the slide film, and the demonstration. All of these belong in this area.

The application. This is the step so often ignored in industrial training. During this step a problem is presented which may be solved either as a group or as individuals. The information that has been presented is gone through carefully, step by step. Then you ask them to solve the problem. For example, if you were using credit aging forms, they should be made out all except some of the totals—the problem would be to evaluate the accounts receivable. Ask and expect each to write out on his problems the follow-up steps he intended to take with each account and why. You should have actual collection procedures in sight so that he could select from them. Then in group discussion, the best in each case could be selected.

Follow-up. Two weeks after the school is over, a follow-up should be made by letter or personal call in order to see what was achieved. In some cases a well trained salesman can help iron out difficulties.

For a short review: There are areas where you, the manufacturer, and the dealer do not have similar interests and you should expect these. You also need to know the dealers and to respect them. You are the only source of help that the dealer has and he must look to you. Do not waste his time, but find out what he wants and give it to him. If you hire anyone to help you, hire a man who has both business experience and good experience in adult education. He will be able to help with teaching techniques, but you should gather your own information for the course. This is something that you must do for yourself. The rewards will be dominance in the field and a chance to live through the competitive stage and into the established stage. ☆

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How Union-Camp's 5-Star Plan saved multiwall user up to $450 per carload of bags

This is a new kind of "Big-Inch" story.

A major mid-west packer* wasn't convinced his multiwall bagging operation was all it might be. Could Union-Camp's 5-Star Multiwall Plan help?

To get the answer, Union-Camp multiwall specialists visited the plant. They found that the automatically filled bags occasionally stuck in the sewing head. Also, that the sewing line tended to "belly" and form an arc pattern. The result was considerable loss in production and frequent breakage. Another problem—the bags didn't warehouse well.

"Sew-Straight" Solution

After completing their analysis, the Union-Camp men suggested installing a "Sew-Straight" attachment right onto the sewing head. The bags could now be closed with an "E" head in a perfectly straight line. And only *1 inch* from the top of the bag. That single inch made all the difference.

Less paper—less breakage

To begin with, shorter bags could be used. The savings in paper alone cut the firm's multiwall costs from between $350 to $450 a carload. Imagine the savings based on several dozen carloads a year!

Before and After. Old, semi-circular closure pattern (left) and the new closure (arrow). Note the straight sewing line, and how close it is to the top of the bag.

The new attachment also speeded production by eliminating sewing head jam-ups. Moreover, since the top closure is now identical to the *factory-sewn* bottom closure, the bags form a perfect pillow shape—no awkward ears. This makes them easier to handle . . . easier to stack. And there's less breakage and fewer rejects.

How much could you save?

Perhaps an idea unearthed through Union-Camp's 5-Star Plan could save you money. The chances are excellent. For every day, multiwall users, large and small, are reducing their multiwall costs by capitalizing on this comprehensive packaging service. Their savings run from a few thousand dollars to over $100,000 a year.

Apart from bag construction, this economy program covers bag design, specifications control, packaging machinery, and a survey of your materials handling operation. And it costs you nothing—regardless of the brand of bags you now use.

FREE 16-PAGE BOOKLET

Write Dept. M-3 today for a free copy of Union-Camp's new 5-Star Plan booklet. It describes many case histories showing how packers like yourself have achieved greater efficiency and economy in their multiwall operation.

UNION-CAMP*
MULTIWALL BAGS
Union Bag-Camp Paper Corporation 233 Broadway N Y 7 N Y

* NAME ON REQUEST

Increasing Fertility of Plant-Growing Media

U. S. 2,963,357, issued Dec. 6, 1960 to Wallace L. Minto and assigned to IBC Research Laboratories, Inc., provides a method for increasing the fertility of a plant growing medium without causing undesirable side effects.

The invention is predicated on the discovery that the addition of certain types of iodine materials to a plant growing medium is accompanied by highly unexpected and beneficial results. These results include not only a greatly increased yield and growing rate but remarkable improvements in the desirable properties of the plants such as large increases in the protein, mineral and sugar content.

Examples of iodine containing materials which may be employed in accordance with the present invention are beta amylose teriiodide, iodinated galactans, and 3, 5, 3′-triiodo tyrosine.

These compounds are characterized by being water soluble and providing in solution the triodide ion I_3—in a concentration normally non-toxic to plant life. In a sense, the present invention contemplates adding an iodine containing material having an ionization constant of such value that upon dissociating in a concentrated aqueous solution it provides triodide ions and the equilibrium products thereof in sufficient concentration to increase the fertility of the growing medium and dilute enough so as not to be toxic. The range of concentration of the triodide ions and their dissociation products should preferably be between 1×10^{-5} and 1×10^{-7} moles per liter.

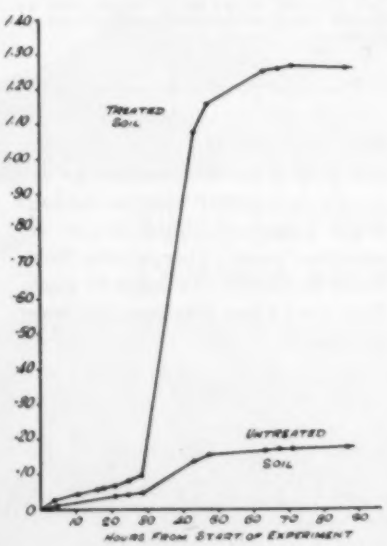
Any suitable method may be employed in distributing the iodine compounds throughout the growing medium, particularly soil. The compound may be applied in an aqueous solution or in a dry state either alone or admixed with inert or other active ingredients. The iodine compound may advantageously be mixed with the seed or applied as a coating thereto with or without other materials.

While the exact function and mechanism of the iodine as applied in accordance with the present invention is not fully understood, it is believed that it radically increases the metabolism of the soil bacteria with its attendant advantages.

It has been long established that the evolution of CO_2 is a direct measurement of the metabolism of micro-organisms and this fact is conventionally employed to effect the measurement of the metabolic activity of micro-organisms. The graph shown in the accompanying drawing illustrates the effects of beta amylose triiodide on the evolution of CO_2 from soil as compared with similar untreated soil. In performing the tests resulting in the data for this graph a sample of thoroughly mixed soil was divided into two equal portions. A small amount of beta amylose triiodide was added to one portion (50 mg. per kilo of soil), the other portion was used as the control. Carbon dioxide-free air was slowly passed through each portion and the carbon dioxide evolution of each sample was measured at four hour intervals. Within a few hours the beta amylose triiodide treated sample began to give off much more CO_2 than the control sample. The beta amylose triiodide induced activity soon was four or five hundred per cent greater than the control and this difference was maintained throughout.

In tests employing the beta amylose triiodide at the rate of one pound per acre, the yield of peas was increased by 71%, carrots more than 200% and strawberries 69%.

Analysis of produce grown in beta amylose triiodide treated soil as compared to that grown in untreated soil showed a 6.6% increase in mineral content and a 53% increase in natural sugar content in Ponderosa tomatoes; in strawberries, 38% higher mineral content, 48% higher reducible fruit sugars, 62% more iron and 74% more calcium.



FERTILIZERS

U. S. 2,961,307, issued Nov. 22, 1960 to William P. Wilson and assigned to United States Borax & Chemical Corp., describes a method of recovering potassium salts from sylvinite ores containing slime-forming clay.

The ore is crushed and screened, and a cut is removed having a particle size in the range of 2-28 mesh. A deep leaching bed is formed of said cut, and a circulating solvent liquid is passed down through it at 200° F. to leach the potassium salts from it. The liquid solvent is maintained substantially saturated with NaCl at the operating temperature.

U. S. 2,962,357, issued Nov. 29, 1960 to William B. Williams and Donald E. Tynan and assigned to International Minerals & Chemical Corp., provides a method of defluorination of phosphoric acid.

U. S. 2,963,358, issued Dec. 6, 1960 to Robert White and assigned to Armour & Co., describes a process for the production of a number of grades of granular fertilizer by the acidulation of phosphate rock.

U. S. 2,963,359, issued Dec. 6, 1960 to George F. Moore and Thomas Beer and assigned to Tennessee Corp., discloses a wet process of directly producing substantially dry, solid, granulated di-ammonium phosphate.

U. S. 2,964,394, issued Dec. 13, 1960 to John H. Haslam and assigned to E. I. du Pont de Nemours & Co., describes a process for the ammoniation of superphosphates.

U. S. 2,964,452, issued Dec. 13, 1960 to William G. Morrison and Byron T. Brown and assigned to Phillips Petroleum Co., describes an ammonia storage and recovery system, utilizing underground salt formations.

PROTECTING PLANTS AGAINST FROST DAMAGE

U. S. 2,961,798, issued Nov. 29, 1960 to Louis E. Wells and assigned to Dumas Milner Corp., provides a method of protecting living plants from frost damage.

The method consists of applying to the plant a film of N-lower alkyl-2-pyrrolidone, 2-pyrrolidone, or butyrolactone, in a non-phytotoxic carrier.

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Unlike soluble salts that leach out in heavy rains, or become fixed in the soil under certain conditions, FTE releases the nutrients as needed. "Fritting" makes possible *controlled, predetermined solubility.* This, in turn, makes fertilizers more productive, much more predictable.

While *two* standard formulas are available, and others are being developed for specific areas of the country, all can be *safely used anywhere,* and *on any crops,* simplifying manufacturing and marketing for our fertilizer customers.

If you are not fully informed about FTE, let us tell you about it. Better yet, *try* FTE in your fertilizers this season. We'll be happy to work with you.

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FERRO CORPORATION *Agricultural Division*

4150 East 56 Street • Cleveland 5, Ohio

Radiation is being used in Australia to destroy insects, according to a report in the Journal of the Australian Institute of Agricultural Science. Dr. P. B. Cornwell, of the staff of the United Kingdom Atomic Energy Authority, says radiation is being used in two ways —directly, to kill insects in grain silos and other places, and indirectly to control the breeding of larvae. Melbourne has the first plant of its type in the world for radiation of imported bales of goat hair to kill disease organisms such as anthrax.

Oxo Chemicals Co. plans to construct a multimillion pound per year isooctyl and decyl alcohol plant at Haverhill, O., according to Jay H. Forrester, president. "Construction will be started this spring, with completion scheduled for early 1962," Forrester said. Newly formed, Oxo is 50/50 owned by Pittsburgh Chemical Co. and Amoco Chemicals Corp.

A leading national economist was a featured participant in discussions of the **International Minerals & Chemical** Corp.'s Customer Advisory Panel in its annual meeting March 8-9. Martin Gainsbrugh, chief economist for the National Industrial Conference Board since 1939, led panel discussions about business and economic conditions. This was the fourth meeting of the panel. A rotating panel of 12 leading fertilizer industry manufacturer executives meets with IMC's top management and outside experts to discuss industry trends, objectives, problems and possible solutions.

Soiltest, Inc. is displaying its equipment at the International Agricultural Exhibition being held in Cairo, Egypt, from March 21 through April 30. Soiltest will show agricultural and irrigation testing equipment.

Commercial Solvents Corp.'s Agricultural Chemicals Dept. held its annual sales meeting recently, with Loy Everett, manager, presiding. Representatives of the sales, advertising, research and production departments attended the meeting in Monroe, La. Dr. Robert Beacher, Zenas Beers and E. K. Chandler of the National Plant Food Institute discussed "Opportunities for Profits."

Gross business volume of farmer cooperatives increased more than 8 per cent in 1958-59 over that of the preceding fiscal year, according to the latest survey of farmer coops just completed by Farmer Cooperative Service, USDA.

Of the total 9,658 marketing, farm supply and related services cooperatives, 4,391 handled fertilizer (gross business $518,000,000) and 2,832 handled sprays and dusts (gross business $70,-118,000).

Monsanto Chemical Co. reports start-up of a manufacturing plant at Monsanto, Ill., for 2,4-D and 2,4,5-T esters for broadleaf weed and brush control.

Superior Fertilizer and Chemical Co. has established a "family relationship" among its line of varied products through use of a new package design. Created by Union Bag-Camp Paper Corp., the new design standardized on two-color printing with a striped background. Old fertilizer and pesticide bags appear on the left, and redesigned bags on the right.

R. W. Phillips has resigned as manager of the Chemical Engineering Service Div. of Manitowoc Shipbuilding Inc. to re-establish his former business in Green Bay, Wis. The firm, to be known as **Chemical Engineering Service of Green Bay,** has temporary offices at 2231 Early St. Construction will be handled under another corporation formed in 1950, known as Chemical Engineering and Construction Corp.

During Commercial Solvents Corp.'s Agricultural Chemicals Sales Meeting, the group dined at the Rendevous Restaurant in Monroe, Louisiana.

Canada's Finance Minister D. M. Fleming (left) receives a golden bolt from Thomas M. Ware, International Minerals & Chemical Corp. president, signifying opening of Canada's potash deposits to world markets in fiscal 1961-62. Looking on (center) is Dr. C. F. Wilson, Consul General of Canada in Chicago. The bolt is a golden replica of one used late in March to complete a 3,500-ton cast-iron lining inside the company's shaft at Esterhazy, Saskatchewan.

"Report of the **First International Agricultural Aviation Conference"** has been published by the International Agricultural Aviation Centre, le v. d. Boschstraat 4, The Hague (Netherlands).

The cloth-bound 9½ x 6½ inch book contains 429 pages and is priced at $7. Described as a "manual for agricultural aviation" the voluminous report includes information on the biological basis of aerial agriculture, orchard spraying, materials, drift, droplet size, distribution equipment, corrosion, and many other subjects.

Tennessee Gas Transmission Co. has formed **Tenneco Chemical Co.** to construct and operate a large petrochemical complex on the Houston Ship Channel. One of the units will have initial annual capacity to manufacture 100 million pounds of acetylene. A second unit will convert a major part of the acetylene into vinyl chloride monomer with annual production of about 200 million pounds. A third product, vinyl acetate monomer, will be manufactured and ammonia probably would be a fourth product, said Joe J. King, president.

Agricultural potash deliveries in the U. S., Canada, Cuba and Puerto Rico by eight American producers and the importers totaled 3,953,505 tons of salts containing an equivalent of 2,305,-212 tons K_2O during 1960, according to the American Potash Institute. This was a decrease of about 1 per cent in salts and K_2O under the same period in 1959. Deliveries for non-agricultural purposes rose 3 per cent over 1959, amounting to 151,274 tons K_2O.

Exports to other countries contained 428,279 tons K_2O, an increase of almost 38 per cent.

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Atlanta Office: 3121 Maple Drive., N.E., Phone CEdar 3-3227
Long Beach Office: 2628 Junipero Ave., Long Beach, Phone NEvada 6-3301

Agreement to sell assets of **Thompson-Hayward Chemical Co.** to **Consolidated Electronic Industries Corp.** has been announced. No change in operations is expected.

Allied Chemical is producing phosphoric acid from new facilities at the East St. Louis, Ill., Works of its General Chemical Div. The plant, with projected capacity of 50,000 tons per year of high-quality wet process acid, will primarily supply fertilizer manufacturers serving midwest agriculture, Allied said.

International trade should continue upward to a record volume by 1962, according to William H. Winfield, president of **Allied Chemical's** International Div. now traveling the Middle and Far East to gain an "on-the-spot" view of the chemical picture in the Eastern Hemisphere. Allied International distributes 3,000 products to world markets for agricultural and industrial use.

Commercial Solvents Corp. 1960 consolidated net earnings rose sharply to $1.70 per share, as compared with $1.00 per share for 1959, reports Maynard C. Wheeler, president. Total net earnings of $4,839,815 are the highest since 1951, and compare with $2,850,740 for 1959.

Consolidated Mining and Smelting Co. of Canada recently shipped the first urea fertilizer from its new $5 million plant at Calgary, Alberta. Engineered by Vulcan-Cincinnati Inc., the plant uses local natural gas as a raw material. In addition to the plant with 100 tons of urea per day rated capacity, the firm also erected a 10,000-ton urea storage building along with separate bagging and shipping facilities.

A safety citation and plaque have been awarded to the Middleport, N. Y., headquarters of **Niagara Chemical** Div., Food Machinery and Chemical Corp., for 1,491,887 man hours without a lost time accident. Presented by Liberty Mutual Insurance Co. of Boston, the award covers almost three years of accident-free operation—from May 23, 1957 to March 14, 1960.

Antara Chemicals, a division of General Aniline & Film Corp, has named three new distributors—Hoosier Solvents and Chemicals Co., Indianapolis, Indiana; Central Solvents and Chemicals Co., Chicago, Ill.; and Wisconsin Solvents and Chemicals Co., Milwaukee, Wis.

New anhydrous ammonia facilities recently installed at **Texaco's** Lockport, Ill., ammonia plant increase producing capacity from 180 tons to 220 tons per operating day. The expansion includes addition of new compressors as well as modifications to existing equipment, according to M. F. Granville, vice president in charge of the company's Petrochemical Department.

Associations Meetings

Plans for joint action on projects of mutual interest were discussed by representatives of the California Fertilizer Association and the National Plant Food Institute in San Francisco. Standing are Sidney H. Bierly, CFA general

manager, and Richard B. Bahme, NPFI western director. Seated: Ed Gould, chairman of CFA Soil Improvement Committee (with Shell Chemical Co.), and Dr. M. H. McVickar, chairman, NPFI Western Research and Education Committee (California Chemical Co.). Forest fertilization, range fertilization and fertilizer safety projects will be jointly sponsored in California by the two groups.

Dr. Walter E. Porter, superintendent of the Delta Branch Experiment Station, Stoneville, Miss., will serve as president of the **Southern Weed Conference** in 1961. Vice president is Dr. John T. Holstun, Agricultural Research Service, USDA, Stoneville; and Dr. R. E. Frans, Department of Agronomy, University of Arkansas, Fayetteville.

More than 500 supervisors have attended regional supervisory safety training schools since they were instituted three years ago. At its winter meeting in St. Petersburg, Fla., in February, the Executive Committee, Fertilizer Section, National Safety Council, unanimously endorsed continuance of the schools, and is again requesting sponsorship through the National Plant Food Institute and the continued overall direction of the schools by W. C. Creel, North Carolina Department of Labor.

Kinney

H. W. Kinney has been named "Northwest Agricultural Chemical **Man of the Year"** by the Western Agricultural Chemical Association. Kinney, a resident of Yakima, Wash., is Northwest regional sales representative for Chemagro Corp. The association's annual "Man of the Year" award is presented to the agricultural chemicals salesman in the Northwest whose qualifications most nearly conform to those of the ideal salesman as determined by the association's eligibility committee.

Stuart W. Turner, consulting agrologist, San Francisco, was appointed advisory director to the **California Agricultural Aircraft Association** at a recent directors' meeting.

About 300 fertilizer dealers, industry representatives and University of Idaho personnel attended the **Idaho Fertilizer Industry Meetings** held recently at Caldwell, Twin Falls, Pocatello, Rexburg and Moscow. A panel on soil testing featured both industry and college personnel. Economic concepts involved in making fertilizer applications, research, and recommendations also were discussed. The meetings were sponsored by the Pacific Northwest Plant Food Association.

New president of the **Northeastern Weed Control Conference** is Lawrence Southwick, project leader in the Agricultural Chemicals Development Section, The Dow Chemical Co. D. A. Schallock, Rutgers University, was named vice president; P. W. Santelmann, University of Maryland, became secretary, and the new treasurer is John Meade, University of Maryland.

Tomorrow's farmer must adapt the latest production techniques and developments "not next season or the year after that, but now" if he is going to "squeeze out his profits from the same or an even smaller share of the consumer dollar." So stated Robert E. Wagner, regional director, **American Potash Institute,** Washington, D. C. at the crops and livestock session of New Jersey Farmers Week. The January 26 meeting was sponsored by the

This mark tells you a product is made of modern, dependable Steel.

Why C. D. uses Stainless Steel tanks – and why you should.

The C. D. Liquid Fertilizer Corporation of Liberty, Indiana, produces complete liquid fertilizers and chemical solutions. The highly corrosive compounds in these liquids would play havoc with equipment that's made of ordinary materials. So they chose Stainless Steel equipment to handle the corrosion problem. Mr. E. E. Crouse, President of C. D. Liquid Fertilizer Corporation says, "You just can't beat Stainless Steel . . . it virtually eliminates corrosion problems and replacement of tanks.

"Stainless Steel tanks are safer and easier to clean out. Stainless' smooth surface leaves no place for foreign material to cling or hide. Screens, booms and nozzles remain open. This eliminates poor jobs, keeps customers satisfied and naturally means more business for us. We use nothing but Stainless Steel for booms and nozzles, pumps and fittings."

Stainless Steel liquid fertilizer tanks outperform and outlast any other containers. And Stainless Steel tanks are a lot more economical in the long run. For more information send the coupon.

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Supply, Steel Service Centers • United States Steel Export Company

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United States Steel Corporation
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Please send me a copy of your free booklet, "Stainless Steel Tanks For All Farm Chemicals."

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New Jersey Crop Improvement Association.

Dr. Wagner stressed particularly the use of fertilizer as a key item in profitable crop production, and better use of homegrown forage.

The **Eastern Lawn,** Garden and Allied Products Trade Show will be held at New York City's Coliseum, October 20-22, reports Frank Weager, managing director.

People

Rayner

Allied Chemical's General Chemical Div. Appointment of George C. Rayner as assistant to the president is announced by Frank J. French, president. With the division 30 years, Rayner had been a general administrative consultant for the past ten.

Russell M. Jones, director of technical service for Allied Chemical's Nitrogen Div., retired January 31 after 30 years with the company.

Amoco Chemicals Corp. has named R. B. Perkins manager—sales technical service laboratory. In this newly created position, Perkins will be located in the company's general offices in Chicago. Two new positions in the Marketing Department have been filled by William F. Christie and Don R. Carmody. Carmody is director of overseas market research and Christie, director of market research in the United States.

Armour and Co.'s board of directors has elected William Wood Prince chairman of the board and chief executive officer, and Edward W. Wilson president. Wilson had been executive vice president of Armour Chemical Industries.

Bradley & Baker. Virgil C. Luman has been named sales representative for Iowa, Nebraska, Colorado, Kansas and Missouri. He will reside in Columbia, Mo.

California Chemical Co., Ortho Div. has appointed Lester D. Dark, Paul M. Miller and Gerald D. Bjelde agricultural sales representatives. Dark will work in Oskaloosa, Iowa; Miller in the Thermal, Calif., area; and Bjelde in the Grand Forks, N. D., area.

Geigy Agricultural Chemicals, Div. of Geigy Chemical Corp. Bill Hightower joins the South Central District field sales staff. He goes to Geigy from the technical sales department of Velsicol Chemical Corp., where his territory was Mississippi and Tennessee.

McCaslin

W. R. Grace & Co. Max M. McCaslin has been named special sales representative for the Nitrogen Products Div. in the Midwest area, with headquarters in St. Louis. He was ammonia supervisor in the Midwest district for Olin Mathieson Chemical Corp.'s Plant Food Div.

George A. McMoran, Jr. goes to the W. R. Grace Public Relations Dept. from Allied Chemical, where he directed publicity programs for the Plastics and Nitrogen Divisions.

Monsanto Chemical Co., Agricultural Chemicals Div. Dr. A. John Speziale has been appointed a senior scientist, after serving as a scientist for the division. Dr. Lawrence J. Machlin has been named a scientist, after serving as a group leader.

F. S. Royster Guano Co. has promoted five of its key executives. Frank S. Moore, vice president in charge of manufacturing, has been named executive vice president, a new position; Dr. T. N. Gearreald, treasurer, is now vice president and treasurer; C. G. Baughman, general sales manager, J. Frank George, assistant vice president for manufacturing, and A. O. Carroway, comptroller, all were named vice presidents.

O. M. Scott & Sons Co. James P. Gurney has resigned, effective April 15, as executive secretary and editor of the American Rose Society to join the Scott company in research and development of their rose program.

Smith-Douglass Co. has promoted William H. Payne to assistant manager for sales of the Norfolk branch, supervising sales territories in North Carolina.

Texaco Inc. reports election of Wallace E. Avery as vice president in charge of West Coast operations, effective May 1.

Union Carbide Chemicals Co. D. M. Yoder has been appointed to the agricultural chemicals technical development group. With Carbide 10 years, most recently as administrator of the agricultural research station at Clayton, N. C., he will now headquarter in New York City.

Corl

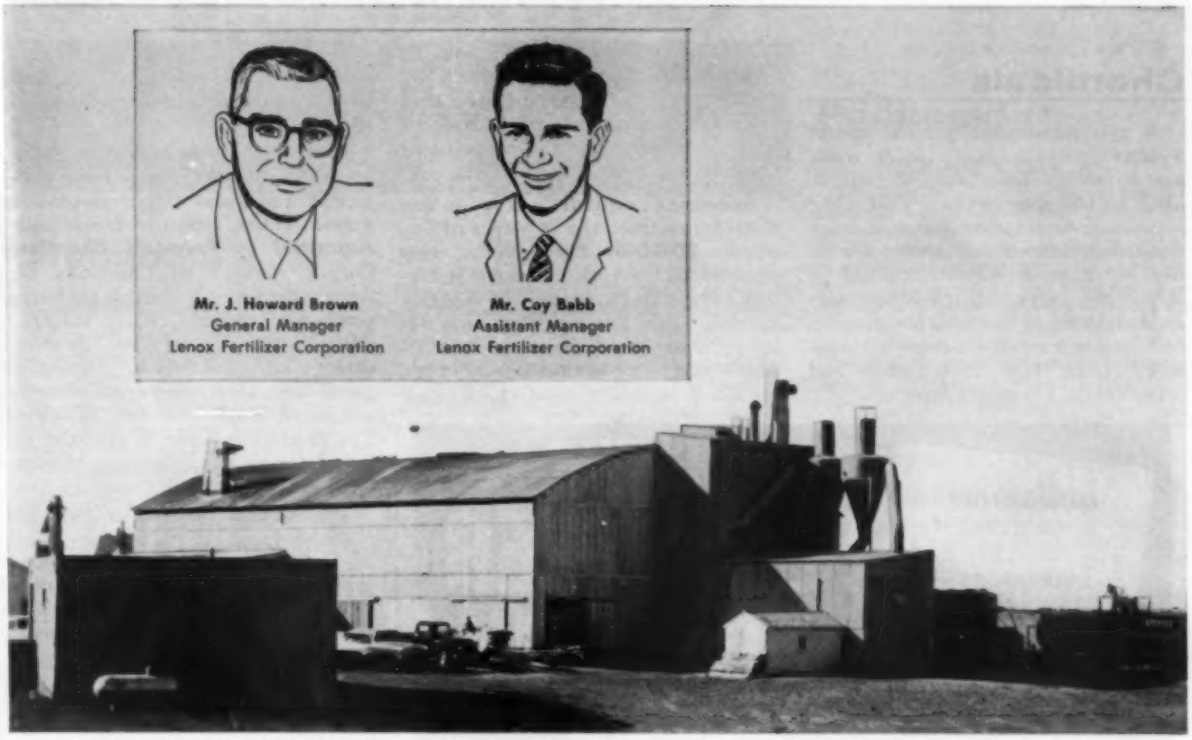
Virginia - Carolina Chemical Corp. William liam T. Corl becomes assistant to the general sales manager, Fertilizer Div. Based in Chicago, Corl will supervise V-C's Dubuque, Iowa, and East St. Louis, Ill., sales offices. He also will establish and supervise a series of custom-mix fertilizer plants. V-C's first custom-mix operation now is being readied in Wellsville, Mo.

Hal Yacowitz has left Nopco Chemical Co., where he was director of applied research and is starting a new consulting service for the feed industry and allied groups. His office is at 221 Second Ave., Bound Brook, N. J.

Heptachlor has been released for use on alfalfa to control alfalfa weevils, **Velsicol Chemical** Corp. reports. USDA accepted a new Heptachlor label for the western United States recently. According to the new label, alfalfa weevil adults are controlled by one application of 4 ounces of actual Heptachlor per acre, made in early spring before new growth exceeds 2 inches. The label points out that harvesting or grazing should not be done within 30 days of application.

Calendar

April 12-14. Chemurgic Council, 26th annual conference, Sheraton-Gibson Hotel, Cincinnati, Ohio.
May 7-10. American Institute of Chemical Engineers, meeting, Sheraton-Cleveland Hotel, Cleveland, Ohio.
May 10-12. American Institute of Chemists, annual meeting, Statler Hotel, Washington, D. C.
May 15-17. Chemical Specialties Manufacturers Association, midyear meeting, Drake Hotel, Chicago.
May 17-18. Chemical Market Research Association, annual meeting, Plaza Hotel, New York City.
June 8-10. Manufacturing Chemists' Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.
June 11-14. National Plant Food Institute, annual convention, The Greenbrier, White Sulphur Springs, W. Va.
June 27-29. Pacific Northwest Fertilizer Conference, Marion Hotel, Salem, Ore.
July 19-21. Southwest Fertilizer Conference and grade hearing, Galvez Hotel, Galveston, Tex.
August 16-20. Canadian Fertilizer Association, annual convention, Manoir Richelieu, Murray Bay, Quebec.
August 29. Agricultural Engineering Field Day, Brookings, South Dakota.
October 29-November 1. National Agricultural Chemicals Association, 28th annual meeting, The Homestead, Hot Springs, Va.
November 2-3. Pacific Northwest Plant Food Association, annual convention, Hotel Gearhart, Gearhart, Ore.
November 12-14. California Fertilizer Association, 28th annual convention, Jack Tar Hotel, San Francisco, Calif.
January 17-19, 1962. Southern Weed Conference, Hotel Patten, Chattanooga, Tenn.



Mr. J. Howard Brown
General Manager
Lenox Fertilizer Corporation

Mr. Coy Babb
Assistant Manager
Lenox Fertilizer Corporation

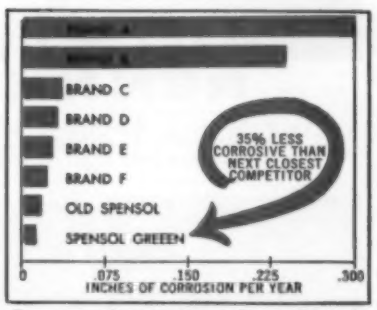
The modern granulation facilities of Lenox Fertilizer Corporation are housed in this plant at Lenox, Iowa.

Why Lenox Fertilizer Corporation Gets Better Corrosion Control With SPENSOL GREEEN*:

A leader in the manufacture of chemically-compounded fertilizers, Lenox Fertilizer Company (above), was one of the first to produce 20-10-5 without the use of a pre-neutralization process. This progressive manufacturer of XL-s brand fertilizer began operation in 1954. Like many other experienced fertilizer producers, Lenox controls costly corrosion damage by specifying SPENSOL GREEEN, the non-corrosive ammoniating solutions.

Corrosion control pays off big by reducing maintenance cost and extending the life of your manufacturing equipment. Even though you can't see the damage being done, corrosive solutions cost you money daily. When corrosion causes tanks, pipe lines or boot tanks to suddenly give out, down time, parts and repair bills can be mighty expensive.

It costs nothing extra to get greatly improved corrosion control—just specify genuine SPENSOL GREEEN ammoniating solutions with the advanced corrosion inhibitor proved to be at least 35% more effective (see chart at right).



Cut corrosion costs at least 35% by making your next order genuine SPENSOL GREEEN! Contact your Spencer representative right away.

Insist on **SPENSOL GREEEN**

NON-CORROSIVE AMMONIATING SOLUTIONS

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*A trademark of Spencer Chemical Company

Spencer Chemical Company
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Sales Offices: Atlanta, Ga., Chicago, Ill., Memphis, Tenn., Omaha, Nebr., Kansas City, Mo.
Works: Pittsburg, Kans., Henderson, Ky., Vicksburg, Miss.

Chemicals

A new registration permits use of **Systox** systemic insecticide on tomatoes to within three days of harvest. Made by **Chemagro** Corp., Systox is a spray concentrate which forms an emulsion when diluted with water. On tomatoes, it gives effective control of aphids and mites, and it has been successfully used to control aphids, mites and leafhoppers on a variety of vegetables, fruits, nuts, forage crops and ornamentals, Chemagro reported.

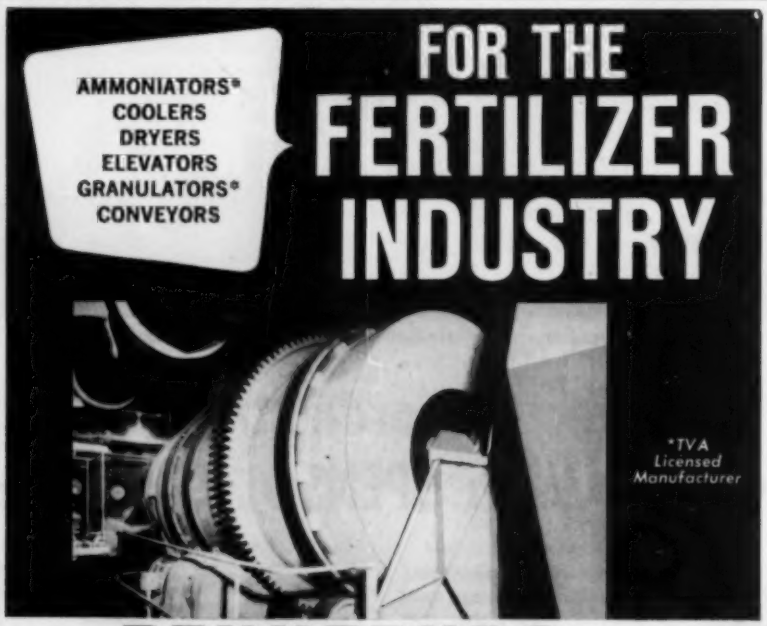
Sevin insecticide has been cleared by USDA to control corn borers on field and sweet corn, according to R. H. Wellman, manager, **Crag Agricultural Chemicals,** Union Carbide Corp.

Spencer Chemical Co. is producing limited quantities of a new type of fertilizer, **30-10-0.** Byron Kern, vice president of the Agricultural and Industrial Chemicals Divisions, said that this addition to the firm's product lines follows a study which indicated that 30-10-0 would be a practical material both for direct application and as a component of complete mixed fertilizers made by conventional methods or by bulk blending.

Ridding farm ponds of water weed infestations and algae has received a welcome helping hand with development of a new contact action herbicide called **Aquathol** by **Pennsalt Chemicals** Corp.'s Agricultural Chemicals Div. Among the weeds it controls are horned pondweed, coontail, water stargrass, milfoil, bushy pondweed, bassweed, curley leaf pondweed, floating-leaf pondweed, sago pondweed, flat-stem pondweed, burr weed and duckweed. The product is made in granular and liquid forms for controlling different weed situations.

The tobacco budworm can be controlled by applications of bait containing dried spores of ***Bacillus thuringiensis,*** a bacterium that causes a fatal disease of this and other insects, USDA states. The bait, consisting of cornmeal and spore, applied by hand to the growing tips of tobacco plants, controlled both budworms and hornworms in experiments conducted in 1960 by entomologists of USDA's Agricultural Research Service and the North Carolina and South Carolina Agricultural Experiment Stations.

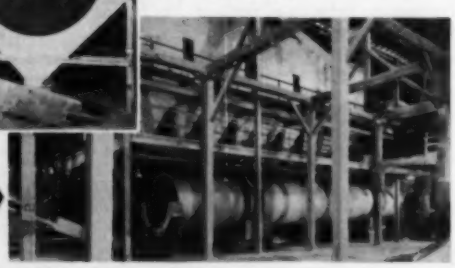
Commercially available, ***B. Thuringiensis*** is not yet being recommended by USDA for use on tobacco, or on vegetable crops which are also subject to damage by hornworms, until further research is completed.



RENNEBURG

7'6" dia. x 15' heavy duty Continuous Combination Ammoniator-Granulator — With 40 HP motor and Renneburg exclusive motorized cam-actuated knockers. Unit handles 70 tons per hour granular fertilizer throughput.

24-million BTU/Hr capacity Renneburg Refractoryless Furnace used with 8' dia. x 60' Dryer (left), parallel with 8' x 60' Counter-Current Cooler.



Renneburg Rotary Drying Unit (behind Counter-Current Cooler in foreground) — Equipped with 5-compartment insulated cloth-type collectors, having orlon dust tube filters for effective air pollution control.

Literature and information on request.

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Pioneers in the Manufacture and Development of Processing Equipment for over 85 years.

Suppliers

Briefs

Chase Bag Co.'s board of directors has announced a realignment of the company's management. Francis H. Ludington became a board chairman and chief executive officer. Succeeding him as president is Elliot K. Ludington, Jr. Francis H. Ludington, Jr., becomes executive vice president. William N. Brock assumes the post of vice president and assistant to the president; Richard H. Ayers becomes vice president—director of sales; John A. Book was named vice president in charge of manufacturing; William Hirst, Jr. becomes treasurer and Joseph H. Kuhr, Jr., controller.

Link-Belt Co. named Erwin A. Wendell manager of advertising and public relations.

Vulcan Containers Inc.'s 33-year old president, Vern I. McCarthy, Jr., has been named to membership in the Young Presidents' Organization, a national group of more than 1600 business leaders who became presidents of their firms before their 40th birthday.

READER SERVICE

FREE INFORMATION to help you solve fertilizer, pesticide problems

Chemicals

98—WETTING AGENT

Make your own check of Petro WP, a wetting agent produced by Petrochemicals Company, with a free lab sample. Petro WP is a powder and flows freely. It is an easy and good mixer. Petro WP is 100% soluble; and quickly soluble in water at room temperature. It is effective even with the new phosphorus and sulfur-containing pesticides. With this wetting agent, you can reduce the amount of dispersant used in conjunction with the wetting agent. Petro WP makes possible a reduction of about 33% in dispersant (from the usual 3% to 2%). To receive your free sample.

CIRCLE 98 ON SERVICE CARD

99—REDUCES CAKING

Save shipping costs by using Micro-Cel, Johns-Manville's inert synthetic silicate. It permits 75% DDT concentration. Other freight-saving, high toxicant concentrations include: 50% chlordane, 70% toxaphene, 50% heptachlor, 75% aldrin and 50% Aramite. Micro-Cel's unique structural characteristics reduce caking, improve flowability, increase suspendability, and extend shelf life. Its surface areas extend up to 175 sq. m/gr. For further information and samples,

CIRCLE 99 ON SERVICE CARD

Process Equipment

100—MONARCH SPRAYS

Monarch Mfg. Works, Inc. has just published a new catalog covering Monarch Stoneware Chamber Sprays, now used by nearly all chamber spray sulphuric acid plants. The Fig. 645 nozzle is used for scrubbing acid phosphate gases. Made for full or hollow cone in brass and "Everdur." Also covered in the catalog are Monarch's non-clog nozzles in brass and steel. You can obtain a copy of Catalog I by

CIRCLING 100 ON SERVICE CARD

101—SEAL-LESS PUMPS

A new bulletin on Series C Chempumps has just been released by Chempump Division, Fostoria Corporation. Bulletin 1052-1 features Chempump's seal-less, centrifugal pumps designed for trouble-free, leak-proof pumping of corrosive, toxic, explosive, radioactive and other problem fluids over a wide range of temperatures and pressures. Pump and motor are built into a single integral unit with no stuffing box, no seals or packing, and no external lubrication required. The Chempump seal-less pump has only one moving part, a combined rotor and impeller assembly, which is driven by the rotating magnetic field of an induction motor. To receive additional information about these seal-less pumps,

CIRCLE 101 ON SERVICE CARD

102—JAW CRUSHERS

The "open door" design of Sturtevant Mill Company's crushing and grinding machinery gives instant accessibility where needed. A new research bulletin, No. 062, features the jaw crushers. These crushing machines can produce coarse (5 inches largest model) to fine (¼ inch smallest model). Eight different models range from 2 x 6-inch jaw opening to 12 x 26 inches with capacities to 30 tph. The jaw crushers operate on double cam principle —crush double per energy unit. For your copy of this bulletin,

CIRCLE 102 ON SERVICE CARD

103—RECOVERY SYSTEMS

A four-page bulletin covering its complete line of Buell-Norblo dust collecting, recovery, and classifying equipment has just been released by Buell Engineering Co., Inc. Featured are electric precipitators, mechanical collectors, bag collectors, classifiers, fans and combination systems. The electric precipitators give positive control of gas flow, superior electron emission, continuous cycle rapping, and low maintenance costs. To learn more about these precipitators and the other systems,

CIRCLE 103 ON SERVICE CARD

Materials Handling

104—HAND TRUCK

A new line of two-wheel industrial hand trucks has been introduced by Harper Trucks, Inc. Conventional models for all types of box, carton and package handling are made in capacities of 400 to 1000 pounds. They are available with solid rubber tired wheels as well as pneumatic tired wheels. Series 1 trucks include three sizes and have expanded metal backs as a unique method of keeping small packages from falling through. All truck frames are of tubular welded steel design for lightweight and strength. Heavy axles and good design for proper load balance when wheeling assure satisfaction under the most rugged use. For additional information

CIRCLE 104 ON SERVICE CARD

105—PLATE FEEDER

The conveyor and process equipment division of Chain Belt Company has published a new seven-page bulletin, No. 6094P, describing its Rex Reciprocating Plate Feeders. The reciprocating plate feeder is designed to feed a variety of materials including coal, sand, ore the stone economically from a bin or hopper. The feeder allows a steady, even flow of material onto a conveyor or into allied equipment. The feeders are available in a number of sizes to meet specific needs. To learn more about this plate feeder,

CIRCLE 105 ON SERVICE CARD

Packaging

106—PACKAGE CASER

The "Sure-Way" Package Caser, manufactured by Food Machinery and Chemical Corporation, is designed to convey, position, assemble and load packages into shipping cases in a continuous, high-speed, automatic operation. It introduces new and important economies with its versatility and gentle handling of packages, overwraps, and labels. It can handle virtually any product that is packaged in a rigid or semi-rigid container, or products that take a rigid form. This machine is available in 13 different models and will fill top-open, side-open, or end-open shipping cases. For further details,

CIRCLE 106 ON SERVICE CARD

107—BAGGING SCALES

To learn more about the various accessories for the G-17 semi-automatic bagging scale manufactured by Richardson Scale Company, you'll want a copy of Bulletin 119. These accessories include the Camgrip bag holder, manually operated universal bag holder, air-operated universal bag holder, quick-change spouts, bag counter, portable scale frame, and gate switch. The G-17 scale may be supplied with belt feeder, with screw feeder, or with vibratory feeder according to nature of material being weighed. To get your copy,

CIRCLE 107 ON SERVICE CARD

Application Equipment

108—SPRAYER

Century Engineering Corporation's self-propelled sprayer is engineered for rugged performance. Nylon nozzles handle all chemicals, even liquid fertilizers. So do the 150-gallon fiberglas tanks. It works equally well in low or high crops. An inexpensive trailer transports this self-propelled sprayer easily at highway speeds. Century can help you sell more chemicals and liquid fertilizers by offering sprayer rentals in your area. For a 20-page information booklet,

CIRCLE 108 ON SERVICE CARD

109—STAINLESS STEEL TANKS

Such highly corrosive compounds as complete liquid fertilizers and chemical solutions are easily handled in stainless steel tanks. Stainless steel tanks are safer and easier to clean out. The smooth surface leaves no place for foreign material to cling or hide. Screens, booms, and nozzles remain open. United States Steel Corporation has published a new booklet, *Stainless Steel Tanks for All Farm Chemicals*. For you copy,

CIRCLE 109 ON SERVICE CARD

See page 54 for information on these Reader Service Numbers:

110—Compacting Herbicides
111—Bulk Trailers
112—Profit Loader
113—Easy Bulk Handling

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- ☐ Organize Your Time
- ☐ The Magic of Enthusiasm
- ☐ Don't Play with Price

Successful Selling Series

- ☐ Secrets of Persuasion
- ☐ 14 Ways to Definite Decisions
- ☐ Convince Your Prospect
- ☐ 18 Telephone Shortcuts
- ☐ What's In It For Me?
- ☐ Hidden Plusses
- ☐ Post Office Can Help Sell
- ☐ Pick Up New Business from Old Accounts
- ☐ Ask for the Order and Get It
- ☐ Beat the Competition . . . With Service
- ☐ Complaints into Sales
- ☐ Demonstrate with Showmanship

Credit Series

- ☐ The Credit Mess
- ☐ Cash Flow Chart Can Ease the Credit Strain
- ☐ Disorganization—A Problem
- ☐ Reaching the Middle Market
- ☐ Credit Training for Dealers

Miscellaneous Marketing

- ☐ Adapt Market Research to Sales Planning
- ☐ Dealer Meetings that Pay
- ☐ Publicity that Sells
- ☐ Merchandising Fertilizer
- ☐ Muscle in Your Marketing
- ☐ Farm Chemicals—Coming Into Their Own
- ☐ Clean Up Your Communications
- ☐ How to Figure Sales Potential
- ☐ Is Your Promotion Effective?
- ☐ Be a Constructive Critic of Your Present Marketing Program
- ☐ Build Sales Through Successful Farmer Meetings
- ☐ Creative Pricing
- ☐ Steps to Good Sales Meetings
- ☐ Obstacles to Marketing
- ☐ Sell A Mental Concept
- ☐ The Herbicide Market
- ☐ Purchasing Patterns for Pesticides
- ☐ How Do Your Dealers' Attitudes & Knowledge Rate?

Reprints 50 cents per copy.

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Willoughby, Ohio

Enclosed is my check for $.....

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Title.....

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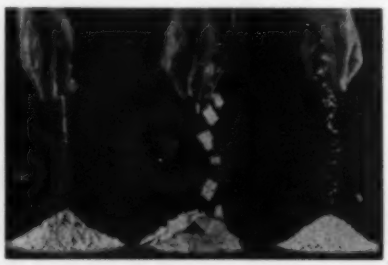
City..... Zone.... State....

NEW & NOTEWORTHY

COMPACTING HERBICIDES

Many of us have thought that compacting herbicides would make them superior to other granular forms. This has now been proven. The continuous compacting process agglomerates a



given material or blend into a solid sheet by passing it between smooth rolls under high pressure, then granulates the sheet into the desired size range.

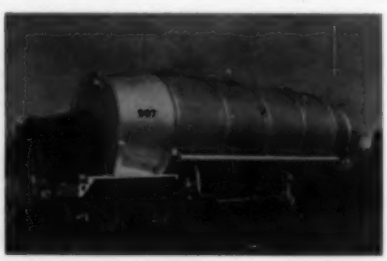
The method has been widely used for several years in production of free-flowing chemical fertilizer granules that have a controlled solubility factor, do not readily abrade, and will not cake during storage or application.

You can get all the facts by writing J. W. Murphy, Allis-Chalmers Mfg. Co., 1126 South 70th St., Milwaukee 1, Wisc., or

CIRCLE 110 ON SERVICE CARD

BULK TRAILERS

Our industry is using bulk trailers to reduce distribution costs and to help you serve customers who are in the



market for LCL shipments or are located away from convenient rail sites.

This new trailer includes a pressure-differential unloading system which insures quick, complete unloading of all chemicals from talc-like to coarse granular fertilizers. The new trailers are made in various sizes. You'll want full details on this equipment, so write to E. J. Howse, Jr., Butler Mfg. Co., 7400 East 13th St., Kansas City, Mo., or

CIRCLE 111 ON SERVICE CARD

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Policy Decisions

(Continued from page 15)

example of this. (See the February issue).

GREATER AUTONOMY FOR "PRODUCT"

First of all, greater autonomy for products' departments thus seems to be the coming thing in the large corporation. Divisionalization—that is the setting up of essentially independent operating divisions which have available to them, but are not compelled to utilize corporate staff facilities—has been accomplished some time ago in many of these industrial giants.

The next step that is going on in several well known organizations appears to be—at least as far as marketing is concerned—carrying this development one step further and setting up separate product departments with at least skeleton marketing activity.

The top marketing staff people increasingly find themselves in the roles of consultants, advisors and coordinators —seeing their ideas and concepts modified and adapted to the special circumstances in each of their companies' separate product lines. Unless, of course, the marketing man himself is given over-all responsibility for the division's operation. I personally happen to know at least two men who started in precisely this kind of a top staff capacity with one corporation, only to be driven by the frustrations of that position to accept responsibility as an operating head of a division in a competing company.

Second, in a line organization, there is also considerable movement to push the decision-making authority down the line. While it may not run full-course in many companies, eventually it is a district manager who emerges as a pivot in such a decentralized line operation. The objectives which individual companies try to accomplish by these moves sometimes fail. This has been spelled out in a number of instances.

For example, a major manufacturer gives his regional line people the authority to handle the problem of distributors by-passing the local factory representative in order to obtain special concessions from the home office. I trust that is never true in the farm chemicals business!

Third is the need for additional staff. This is one of the invariable consequences of decentralization and the proponents of it admit it somewhat grudgingly. In the first place, whether it's a district manager, another representative or lower level executive, who is assuming some of this delegated responsibility, he must be trained and developed far more fully than we normally think of developing him.

Also, to make it possible for those in the lower echelon to reach the right decisions, the home office must undertake to furnish them with considerably more information, facts and reports than they have had in the past.

Fourth, some misgivings are beginning to appear regarding the optimum expense of this divisionalization. In the first place, all decentralization ultimately involves some expansion and possibly also duplication of staff. This, at the very time when many men in top management are already getting worried about the tremendous rate of staff expanding in their organization!

The additional duplication involved in decentralization is causing concern and in some instances, at least, led to the cancellation of decentralized functions. This involved the pulling back of such responsibilities into the divisional office, at least—and in three instances which I've personally known of—even back into the headquarters office.

There is also growing concern over the possible undermining—or at least confusion—regarding corporate policy. In one instance decentralization of advertising responsibility led to such a variety in advertising approaches that many of the divisions have actually strayed from the corporate line—thus hurting each other in terms of effectiveness.

In summation, let me say that despite these reservations, decentralization will undoubtedly continue — especially in marketing. However, I have brought these instances to your attention because there are, in my judgment, lessons to be learned from the experiences of those companies which have moved either too far or too fast.

The real answer for any company may well lie in the management philosophy expressed by one of the most progressive directors of marketing whom I know. He cites that our question about decentralization suggested instead that his company had, "centralization with delegated responsibility." In other words, the final authority remains in one central place. Individual responsibilities are delegated as far as delegation is feasible and desirable.

This is very close to the concept voiced by a top officer of a leading manufacturing corporation who emphasized to me the "need for centralized control over any decentralized efforts."

What both of these men seem to express is a genuine need for delegation and gradual decentralization, but a development which is kept within bounds and in step with over-all company policy by effective central supervision and direction. Precisely because of its current rates of dynamic change such safeguards seem particularly necessary in the field of marketing. ☆

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What the new farm Census didn't tell you

Is the farmer of 1961 much different than the farmer of 1954?

The Census which covers the period 1954-1959 shows that he's bigger. We expected that, of course. This Census confirms a lot of things that FARM CHEMICALS has reported right along. Here are a couple of other facts:

- He's more specialized and more commercialized.
- He's much more mechanized than he ever was.

All this didn't come as any great surprise either.

What the Census didn't say was:

- The farmer is more self-sufficient than his city neighbor.
- There is a feeling of similarity or sharing in his work known in very few other occupations.
- His status in the community is more a result of *personal qualities* than income or occupation. Community leaders in rural areas are more commonly chosen on personal qualities than in urban areas.
- He wants constructive "know-how" offered along with a supplier's products.
- He's no "stick-at-home." He travels outside the county for information more than ever. (In one study the average farmer made 12.8 "information gathering" trips outside his home county during a five-year period—including trips to farm meetings.)

These aren't *Census* facts. They are the kind of facts that are available to you through *market research*. You didn't have to wait five years to learn about this.

One company has been conducting this kind of research for many years—Doane Agricultural Service, to whom we're indebted for the above facts. There is a growing list of companies becoming more interested in this *big buyer*—the farm businessman of 1961—every year.

With one out of four farmers going out of business during the period of the latest Census, we can't help but wonder how *farm chemicals concerns* will fare the next five years!

There are still plenty of companies trying to sell the farmer on the basis of the way he reacted to sales efforts 10 or 20 years ago. It just won't work in 1961.

Doane Agricultural Service came out with some illuminating facts about farmer attitudes in its March *Farm Market Letter*. With all the excitement about the new Census, it seems like a good time to bring this to your attention. The Letter said that attitude of farmers has generally improved since last fall and winter.

"Their receptiveness to sales campaigns is definitely affected by the price movements on major farm commodities," reported Doane.

The report said that many Midwest commodities have gone up in price since late fall. This is the basis for renewed optimism in the Corn Belt.

Doane presented some other worthwhile facts about the 1961 farmer.

"Marketers who fail to recognize that many unique farmer characteristics exist—and that they can be reflected in different ways in purchasing decisions regarding agricultural chemicals, gasoline or animal health products—may find their advertising and promotional appeals in basic conflict with fundamental needs and interests," the Letter said.

Marketing people need a basic understanding of the *social and environmental factors* which influence farmers' actions if they are to sell farmers effectively, reported Doane.

"It is not enough to know that these influences exist. It is necessary to understand the relationship between these influences and farmers' decisions to purchase a particular product," the article continued.

You didn't need the Census to tell you that farmers are using *more fertilizer*. But they still aren't using anywhere near enough! More than 9 million acres, or 8 per cent greater than in 1954, were fertilized. In the states of Illinois, Iowa, Kansas, Michigan, Minnesota, Nebraska and North Dakota the increase in acreage fertilized from 1954 to 1959 totaled over 9.3 million acres. There were also substantial increases in the acreage fertilized in several Western states—California, Colorado, Idaho, Montana, and Washington. *But in the 16 Southern states, the acreage fertilized decreased by more than 3 million acres.*

In a report on the agricultural economy given at the National Fertilizer Advisory Panel at International Minerals & Chemical Corporation, March 9-10, Anthony E. Cascino, IMC marketing vice president, said that the farm outlook is for "an even better year than last, which was good."

He said cash receipts in the year ended June 30, 1960, were almost equal to the record high of $34½ billion, and farmers' bank deposits are at a record high level.

"Tony" forcast a *10 percent* increase in fertilizer use over last year.

So the 1961 race is on. Our industry is optimistic at a time when the rest of the economy is shakey. And with increased activity by Niagara, IMC and other marketing-minded companies, we think that the sixties are sure to go down in history as the era of marketing.

Gordon L. Berg

EDITOR

We're name dropping but...

Big Chief Kay-Two-Oh is only trying to impress you with the fact that all sizes of our 60% Muriate of Potash, by ANY name, are the best bet for your manufacturing operations.

At a recent pow-wow, a special committee of the National Plant Food Institute suggested that distress smoke signals from buyers indicate (ugh!) confusion caused by different names for similar products. To bring orders out of chaos (Indian-type pun), we're happy to go along with the rest of the industry in standardizing our nomenclature (paleface-type word meaning "names").

PCA Standard (the little one), remains PCA Standard. But henceforward, as of the new season, July 1st, PCA Special Granular (the middle one) will be known as PCA Coarse, and PCA Coarse Granular (the big one) will be known as PCA Granular.

So at last we've answered the question: What's in a name? Convenience for you in ordering from any source. But for top quality potash, and top service, be sure to order from PCA, top man on the totem pole.

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